1: Bowen-Jones et al. K-5 (1955-1958) 1961

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[p. 2-A]

Fig. 1 Relief Map of Malta and Gozo.

1: Bowen-Jones et al. K-5 (1955-1958) 1961

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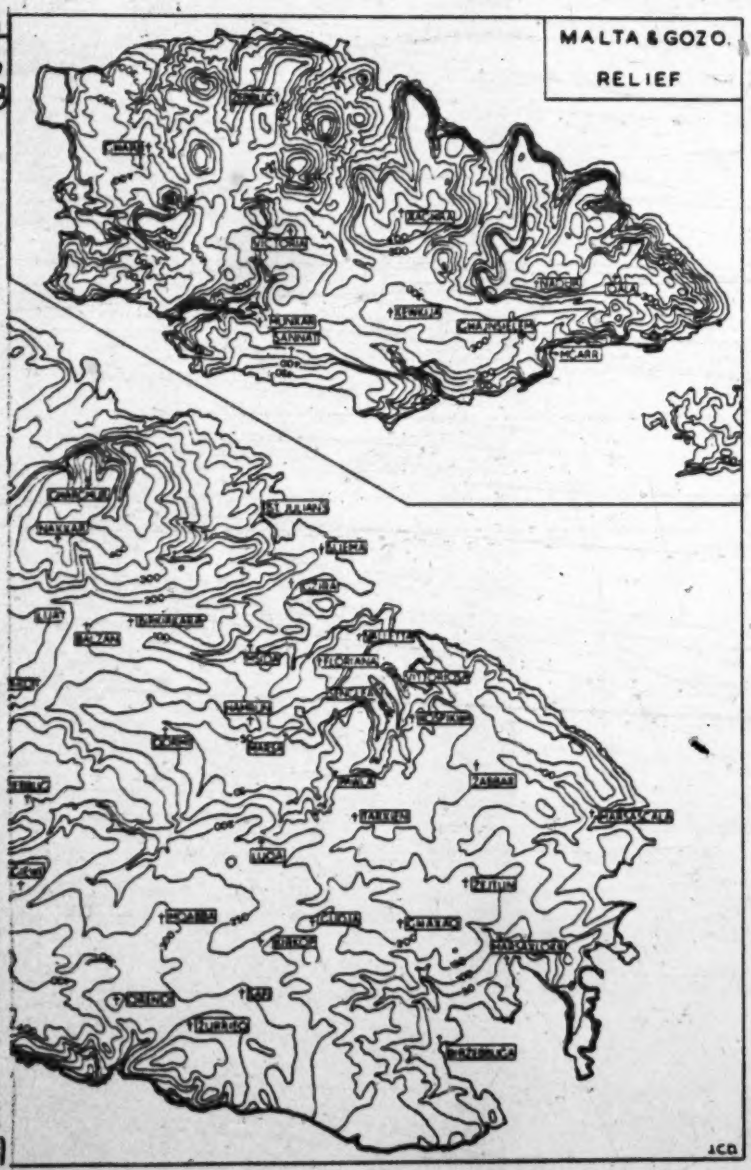

Fig. 1

Relief Map of Malta and Gozo.

[p. 2-B]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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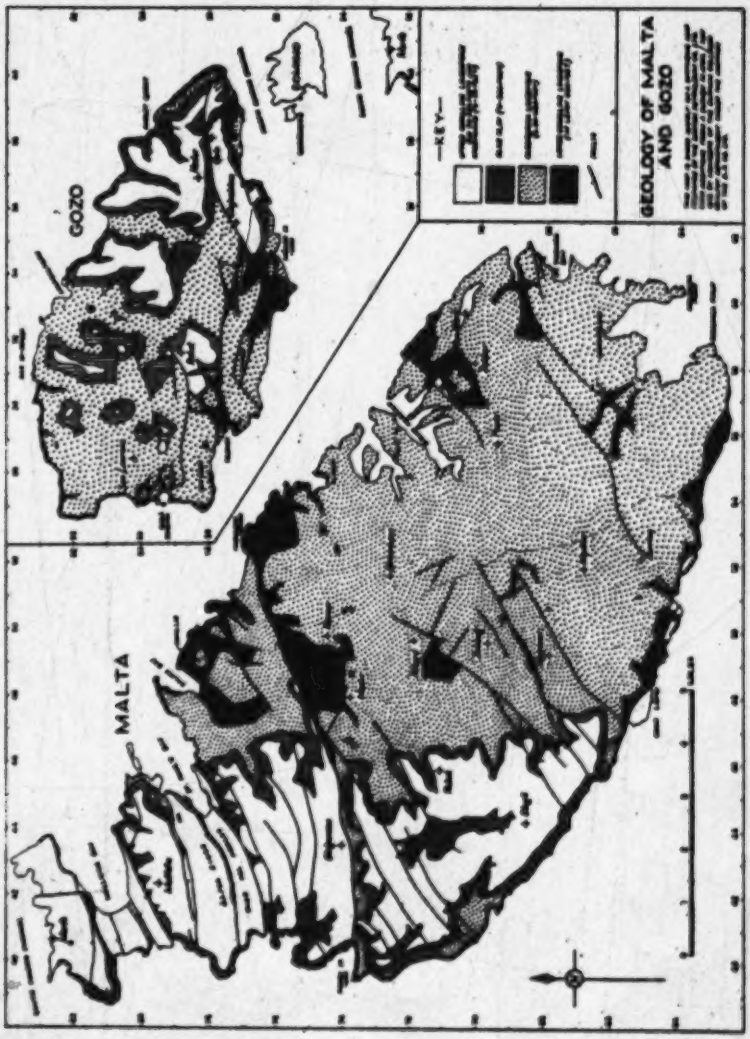

Fig. 3 Geology of Malta and Gozo.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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Chapter 1

A. GEOLOGY AND STRUCTURE OF THE MALTESE ISLANDS

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INTRODUCTION

The central Mediterranean islands of Malta, Gozo and Comino lie 58 miles due south of Sicily, 220 miles due north of Tripoli and about 180 miles east of Tunis. The Maltese archipelago trends north-west to south-east and is 28 miles in length. Malta, the largest and most southerly island, is 17 miles in length and nine miles wide and has an area of 95 square miles. Gozo is nine miles long, up to four miles wide, and has an area of 26 square miles. The island of Comino, in the Comino Strait separating the two islands, occupies only one square mile. A submarine ridge, averaging 50 fathoms in depth, extends southwards from the Ragusa peninsula of Sicily towards the islands, and it continues on as a broader and deeper shelf to the African coasts of Tunisia and Tripolitania. This submarine ridge, which separates the Mediterranean into two main hydrographic basins, represents a sunken land bridge which connected Africa and Europe during parts of the Pleistocene and later Tertiary.

The islands are entirely composed of Tertiary limestones with subsidiary clays and marls. Superficial deposits, mostly Pleistocene in age, take the form of cliff breccias, cave and valley loams, sands and gravels. The succession of Tertiary rocks on the islands is as follows:-

		Feet
5. Upper Coralline Limestone	at least	530
4. Greensand		0-50
3. Blue Clay		0-230
2. Globigerina Limestone		75-680
1. Lower Coralline Limestone	at least	626

The Lower Coralline Limestone and Lower Globigerina Limestone belong to the Aquitanian stage and the Middle and Upper Globigerina Limestone and Blue Clay to the Burdigalian. The Helvetian is represented by the Greensand and the Tortonian by the Upper Coralline Limestone. All these stages fall within the Miocene period, following Eames' recommendation that the Aquitanian is Miocene rather than Oligocene.

The strata have an undulating regional dip to the south-east and the islands are cut by a system of normal faults, striking ENE, which affects Malta especially and is responsible for cutting that island into a series of horst and rift blocks.

The first description of the geology of these islands was given by Commander T. A. Spratt (1843 and 1852) and later a general account was given by Murray (1890) and his work stimulated others, especially Cooke (1893, 1893a, 1896, 1896a), to examine the rocks in more detail. During this century Rizzo (1932), Paver (1943), Sir E. B. Bailey(1943) and Morris (1952) have added detail mainly in connection with an examination of the water resources of the islands. Recently the literature has been reviewed and summarised by Reed (1949) and Hyde (1955). The fossils have been studied especially by Gregory (1891), Stefanini (1908), Roman and Roger (1939) and Eames and Cox (1956). The interesting fauna of the Pleistocene cave deposits have been described by Cooke (1891, 1896b), Cooke and Smith Woodward (1893) and Bate (1935), and Evans (1954, 1959) has described the prehistoric pottery sequence.

Note: Throughout this chapter, *four-figure grid references* have been used to locate the south-western corner of the kilometre grid square containing the feature named. The grid in use is that appearing on the standard two-inch map of Malta and Gozo, G.S.G.S. 3459, Edition 4, 1954, and reproduced on Fig. 3 et seq. The Roman numerals refer to regions marked on the inset map of Fig. 3.

STRATIGRAPHY

●133 The geological formations of the islands are very distinctive lithologically and this is reflected in the characteristic topography and vegetation which they produce. The Lower Coralline Limestone is responsible for forming the magnificent cliffs, some reaching 450 feet in height, which bound the islands especially to the west: but the rock is tough and intractable and inland usually gives rise to a barren grey limestone-pavement topography. The gentler, terraced slopes which succeed the Lower Coralline Limestone around the cliffs witness to the softer Globigerina Limestone which is the most widespread formation on the islands. It produces rather meagre soils, intensively cultivated, and a gentle, rolling landscape. The overlying Blue Clay, aided by the spring seeps above it, forms the most fertile bedrock on the islands. The outcrop is usually narrow and the slopes steep, but they are carefully terraced and tilled, except in the places where rains have produced unstable clay 'slurries'. The Upper Coralline Limestone caps the tabular hills, some of which reach 800 feet in altitude. These hill tops are typically barren and bare limestone plateaus of karstic types with joint cracks, small solution holes and underground caves.

The Tertiary succession bears a strong resemblance to that of south-east Sicily where a limestone-clay-limestone sequence occurs, and to that of North Africa (Macfadyen 1930). It is comparable to that of the Vienna Basin and representatives of the first Mediterranean stage of Suess (1904) are seen in the Lower Coralline Limestone and of the second Mediterranean stage in the Upper Coralline Limestone. The Blue Clay represents the 'schlier' facies, well developed, though probably diachronous, in the peri-Alpine region from Bavaria westwards. The Maltese sequence also bears a resemblance to that of Sardinia and southern Spain and the West Indies with which Haug has postulated a Miocene geosynclinal connection (Cottreau 1914, Stefanini 1924, Blow 1957).

1. Lower Coralline Limestone

This formation forms the characteristic vertical cliffs around most of Malta south of Fomm ir-Rih (4073) and St. Paul's Bay and also in western Gozo. The most magnificent cliffs are those south of Sannat, Gozo (3186), where 450 feet are exposed. A similar thickness is visible in the less spectacular cliffs near Ghar Lapsi, Malta (4864). The formation continues for a good depth underground and a borehole at Maddalena Quarry, Malta, penetrated 626 feet without reaching the base. Inland the Lower Coralline Limestone is brought up in several inliers, frequently associated with faults. The largest inlier, over one mile in width, is north of Mosta (4873) and Naxxar in central Malta and there is another, half a mile across, around the Attard Lunatic Asylum one and a half miles south of Mosta. This formation has been worked in a small way for ornamental stone on both islands under the name 'zonqor'.

The Lower Coralline Limestone is usually a dense, semi-crystalline, massive to moderately bedded limestone, occasionally silicified, ranging in colour from pure white to red and buff. The rock is largely composed of calcareous algae, especially *Lithothamnium* together with mollusc and echinoid fragments and common Foraminifera. A particularly well developed algal horizon occurs around Attard, Malta, where the limestone is silicified.

At the top of this formation is a characteristic band, a few feet thick, with numerous fossil sand-dollars, called the *Scutella* bed (Roman and Roger 1939). In Gozo and in north, east and south Malta it takes the form of a yellow detrital limestone, coarser than the Globigerina Limestone above, with *Scutella*, *Eupatagus*, *Schizaster*, *Echinolampas*, *Cidaris* and other echinoids with occasional nests of *Lepidocyclina* and *Bryozoa*. In some other places, as in central Malta around Attard and Naxxar, the *Scutella* bed cannot be recognised.

2. Globigerina Limestone

This formation outcrops over large areas in western Gozo and central and southern Malta and it provides the beautiful golden brown building stone, the 'franka', used for most of the buildings on the islands. The formation shows marked thickness variations. The greatest thickness now exposed, about 680

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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feet, is in southern Malta near Marsaxlokk (5965) and the thinnest, about 75 feet, is below Fort Chambray (3686) in southern Gozo. In general it is thinnest along a line passing north-south through the Comino Straits. 133

The Globigerina Limestone is a fine-grained white to buff calcarenite completely composed of calcareous tests of globigerinids, anomalinids, and other small foraminiferans. Within the formation are developed horizons of phosphatic nodules, usually very thin, and two of these extend throughout the islands and enable a subdivision to be made into lower, middle and upper divisions. These horizons are composed of individual nodules ranging from less than pea size to several inches in diameter. They range in colour from black through dark brown to green and are largely composed of collophane with up to 40 per cent. phosphate of lime in the lower beds.

One of the best exposures of the whole succession is seen near Fomm ir-Rih (4073) on the western coast of Malta. There the Middle and Lower Globigerina Limestone is best seen on the upthrown side of the Victoria Lines Fault at Fomm ir-Rih itself whilst the Upper Globigerina Limestone and the junction with the Blue Clay is seen 1,300 yards to the north-west. The succession is as follows:-

	Feet
3. Blue clay -	seen to 178
2. Globigerina Limestone	
(iii) Upper Globigerina Limestone	
Yellow-orange fine-grained and honeycomb-weathering limestone with abundant pteropods and scattered ferruginous nodules -	23
Light-grey/blue argillaceous marl -	25
Yellow, friable and jointed fine-grained limestone with scattered ferruginous nodules -	28
Yellow limestone as above but with several phosphatic seams (one is developed at Fomm ir-Rih and there forms a marked projecting cornice) -	9
(ii) Middle Globigerina Limestone	
Phosphatic nodule bed with limestone pebbles and abundant corals, fish teeth and other fossils, the whole passing irregularly down into the bed below -	3/4
Light grey to intensely white-weathering chalky limestone with khaki-hearted cherts in the middle portion: several thin nodule seams within it, two well marked ones lie 14 feet and 19 feet above the base -	129
(i) Lower Globigerina Limestone	
Phosphatic nodule bed forming a massive ledge with ferruginous and phosphatic nodules and abundant casts of fossils and fish teeth, etc. -	1
Fine grained yellow limestone with abundant *Pecten* spp. and Bryozoa -	3
Bryozoan and foraminiferan rock -	4
1. Lower Coralline Limestone	
Dense crystallised limestone forming sheer cliffs below -	100

The widespread *Scutella* graveyard, which is not well developed at Fomm ir-Rih, suggests that in upper Lower Coralline Limestone times the sea floor was nearly flat. During the deposition of the Lower and Middle Globigerina Limestone a zone of lesser sedimentation stretched through the Comino Straits while greater accumulation took place in a basin near Valletta and in western Gozo.

(i) Lower Globigerina Limestone: This division is typically a yellow, fine grained, occasionally fucoidal limestone, usually unbedded. It varies from a few feet in thickness, as at Fomm ir-Rih, to more than 300 feet near Valletta. 133 316

133 [316] Malta, and over 70 feet in western Malta. It provides the most important building stone on the islands, the 'franka', which is a very easily cut freestone which is worked in large, vertical sided quarries especially around Mqabba, Malta (5267), Sannat, Gozo (3186) and north of San Lawrenz (2891). The franka when used for exterior work weathers well. The stone develops a tough outer layer but in time this often exfoliates and weathers in a curious honeycomb manner. There are abundant fossils in this division the commonest being *Flabellipecten*, *Schizaster* and *Eupatagus*.

A ubiquitous phosphatic nodule bed, varying from a few inches to three feet in thickness, marks the upper limit of the division. Within the limestone there are other seams of phosphatic nodules of only local distribution. There are two such near Naxxar (4974) at 40 feet and 90 feet above the base. The upper phosphatic nodule bed (bed G of Cooke 1896, p. 803) yields abundant fossils including the teeth of a giant shark *Carcharodon megalodon* and of the seal *Phoca rugosidens* and also *Stereodon*, *Notidanus* and *Odontaspis*. There are also corals, *Trochocyathus* spp., pectens and echinoids.

(ii) Middle Globigerina Limestone: The white marly limestones of this division which follow above the nodule bed at the top of the Lower Globigerina Limestone are everywhere readily distinguishable from the beds below in colour and lithology. The division is absent in eastern Gozo but increases to 150 feet near Rabat, Malta, and 390 feet in Marsaxlokk Bay (5965) where the series is very well exposed. Within this rather monotonous series several minor horizons of dispersed phosphatic nodules occur locally in west and central Malta. Also khaki-hearted cherts are developed in the lower portion and these form a prominent feature inland one mile south-west of Siġġiewi, Malta (4967). A widespread phosphatic nodule bed marks the upper limit of this division and below this in western Gozo is a coarse yellow limestone unit.

The sparse fauna found within the Middle Globigerina Limestone includes the typical Langhian or Burdigalian nautiloid *Aturia aturi*. Also there are the echinoids *Brissopsis* and *Schizaster* and several pectens. Of particular interest are the remains of the turtle *Tryonx melitensis* and the crocodile *Tomistoma*.

(iii) Upper Globigerina Limestone: The upper nodule bed at the top of the Middle Globigerina Limestone is followed by a return to yellow and coarser beds similar in lithology to the Lower Globigerina Limestone. This division does not show the same pattern of thickness variation as the two lower divisions. Typically it is 70-80 feet thick but expands southwards and at Delimara Point in south Malta (6064) there is at least 140 feet.

This division can be farther divided in many places into three parts: a lower, yellow, fine grained limestone, a light blue marly and argillaceous division, and an upper, fine grained yellow limestone with common pteropod casts and honeycomb weathering. When well exposed, the junction with the Blue Clay above is [317] always clearly seen and it is difficult to understand why a contrary view is so widespread in the literature.

3. The Blue Clay

This formation, often called the 'Maltese Clays and Marls' or the 'Clays and Marls', lies conformably upon the Globigerina Limestone. It is a series of blue and yellow clays and marls, yielding selenite, up to 230 feet in thickness but at times thinning out completely. The clay is of considerable importance as a seal to the Upper Coralline Limestone and Greensand aquifer and has been used for pottery.

There has been considerable dispute as to the cause of the thinning of the Blue Clay. Murray and Cooke considered it was due to pressure of the Upper Coralline Limestone above leading to superficial 'bulging'. This is clearly a factor in most places, but in certain regions the Greensand and Upper Coralline Limestone may rest directly on the Middle and Lower Globigerina Limestone on a scale too vast to be interpreted as due either to 'bulging' or to removal by erosion of the intervening clay. In particular around San Anard (5970), two miles south-east of Valletta, the Upper Coralline Limestone transgresses northward over much of the Middle Globigerina Limestone and finally rests on the Lower Globigerina Limestone within half a mile.

Within the clay, rounded grains of quartz, augite, felspars and tourmaline have been recorded (Cooke 1893) and the fossils include pectens and *Aturia aturi*. These are of pelagic habit and similar to those typical of the true 'schlier' facies. 133

4. Greensand

The greensand is a coarse, orange-brown, thick bedded fragmental limestone which usually forms the base to the Upper Coralline Limestone cliffs. In the unweathered state an abundance of glauconite gives the rock a green colour. The thickness reaches a maximum of 50 feet in south-west Malta but it is usually about half this figure. In other places the formation is absent. The boundary with the Blue Clay below is very abrupt and, around the coasts, landslips commonly begin there. The upper boundary is often more difficult to define.

Frequently the rock is full of giant Foraminifera and has been termed a 'Heterostegina Rock' (Murray, 1890). Such developments are common on Gozo and near Dingli, Malta (4468). The formation has yielded a very rich echinoid fauna including *Clypeaster*, *Heteroclypeus* and *Echinolampas* together with shark teeth and the remains of dugongs, manatees, dolphins and whales.

5. Upper Coralline Limestone

This is the youngest Tertiary formation in the islands. Generally it caps the highest hills but, especially in northern Malta, faults bring it down to sea level. On Comino a thickness of some 250 feet is exposed and 530 feet was penetrated in a borehole near the centre of the Binġemma Syncline (4374) without reaching the bottom. Usually only about 100 feet is preserved on the high land. The rock varies considerably. Frequently it is composed of large growths of the coralline alga *Lithothamnium* with marly partings between the growths. In places it is a dense crystalline limestone and elsewhere there are thick marly seams rich in fossils. Compact limestone predominates, however, and it is usually poorly bedded. On Gozo the stone has been quarried as 'Gozo Marble' which is hard, red to yellow in colour and taking a good polish. Petrologically the formation is very similar to the Leithakalke of the Vienna Basin with which it has been correlated (Fuchs 1874). [316]

Fossils other than algae are locally abundant and they include the echinoids *Cidaris*, *Clypeaster*, *Schizaster*, *Echinus*, *Brissus* and *Echinolampas* together with abundant Foraminifera and large mollusca.

PLEISTOCENE AND RECENT DEPOSITS

These deposits may be conveniently divided into first, the valley loams and sands, second, the coastal conglomerates and breccias, third, the bone deposits in caves and fissures and finally the prehistoric remains.

The only widespread areas of valley deposits with stratified sands, loams and gravels of fluviatile origin are in the valley areas behind Mellieħa, St. Paul's and Salina Bays.

Conglomerates and coastal breccias, often with Pleistocene Mollusca, occur in small patches around the Marfa Ridge, St. Paul's Bay, Mellieħa Bay, Għar Lapsi, Benġlisa Point (5863) and St. Thomas Bay (6067). They usually form a moderately cemented rock composed of local material (Trechman 1938).

The Pleistocene ossiferous deposits, filling caves and fissures in the limestones, have yielded numerous interesting animal remains. The Għar Dalam Cave (5765) is the most celebrated but there are others at Qrendi, Żebbuġ, Mellieħa and Malak. The oldest faunas include Pleistocene dwarf hippopotomi, pygmy elephants, dormice and swans and a later deposit has horse and deer.

Stone Age remains include 15 temples, the best of which is perhaps Tarxien, Malta (5660) which has provided vessels and amulets as well as statuettes of grotesquely fat divinities (Zammit 1930), but others are very fine, especially Ħaġar Qim, Malta (4965) and Ġgantija, Gozo (3489). There is also a three-storied Hypogeum at Pawla. The complex system of cart tracks, with cross roads and junctions, are probably also of neolithic age. A detailed cultural sequence based on potsherds has recently been described by Evans (1954, 1959). 172

133 STRUCTURE

The Upper Coralline Limestone which crops out in eastern Gozo, Comino and in north and west Malta may be interpreted as marking the site of a much-faulted elongate basin, the axis of which strikes approximately N-S and which centres on Comino and north Malta. About four miles east of this line there is a disturbed anticlinal belt which runs from Salina Bay (4878) due south to Għar Lapsi (4864) which is responsible, in part, for bringing the Lower Coralline Limestone to the surface around Mosta and Attard. Farther east the Globigerina Limestone forms a broad basin around Valletta and east-central Malta. In Gozo the faulted and gently folded strata rise towards the west and south-west.

The rocks on Malta are cut by a series of normal faults which cross the island in ENE to NE directions. Structurally Malta may be divided into two regions by the greatest of these, the Victoria Lines Fault, which downthrows north and passes from the west coast at Fomm ir-Riħ (7340) to the east coast at Madalena Tower (5277). North of this fault are a series of rift and horst blocks which divide northern Malta into a series of valleys and ridges. South of the Victoria Lines Fault, the displacement on the faults is less conspicuous.

REGIONAL STRUCTURAL DESCRIPTION

It is convenient to describe the structure of Gozo first, then the northern half of Malta, and finally southern and central Malta.

1. Gozo

The island of Gozo is structurally a block tilted to the north-east so that along the northern coast between Ras ir-Reqqa (3193) and Daħlet Qorrot (3889) the top of the Lower Coralline Limestone is below sea level, whilst in the south-west, at Ben Gorġ (2788) and ta'Ċenċ (3286) it is around 400 feet above sea level. However, in the south and west this picture is disturbed by normal faults, fault complexes and flexures of some magnitude.

Over the northern half of the island the top of the Lower Coralline Limestone dips gently NE or NNE from about 200 feet above sea level at Rabat (3189) to 50 feet below sea level near Marsalforn (3392).

The southern part of the island, between Qala Dwejra (2789) and the North Comino Channel, shows more complicated structures. Here there are four structural downwarps around Qala Dwejra, Xlendi Bay, Mġarr ix-Xini and Għajnsielem, and complex faulting is associated with these. The Dwejra region (2789) forms a peculiar structural and topographical basin, almost a mile across and opening westward, in the centre of which the top of the Lower Coralline Limestone is brought near to sea level whilst at St. Lawrenz and Ben Gorġ, one mile to the north-east and south respectively, it is at least 300 feet above sea level. In the centre of the downwarp are several circular or semicircular faults, the fault planes of which are clearly visible as walls around small amphitheatres about 350 yards across. These are probably collapse structures, but their origin is obscure. Through the region pass several east-west faults, one of which, with a downthrow to the north, continues to Rabat.

Around Xlendi Bay (2987) there is another structural downwarp accompanied by complex faulting. The major fault runs north-east up the Wied ix-Xlendi and subsidiary faults join it especially from the north where it is linked with the Qala Dwejra-Rabat Fault. Dips in towards the valley are high, reaching 28°SW. The structural low brings the top of the Lower Coralline Limestone to less than 50 feet above sea level, whereas near Ben Gorġ to the west (2788), it is at 400 feet and along the cliffs near ta'Ċenċ to the ESE (3286) it reaches over 450 feet above sea level, the highest structural elevation on the Maltese Islands.

The valleys around Mġarr ix-Xini (3486) mark the site of a tectonic depression and fault complex. The two largest faults on Gozo pass out from this centre, one, to the WNW, reaches to Sannat and downthrows over 200 feet north, the other passes north-west to near Għajnsielem and on to Qala. Connected structurally with this complex is a syncline which passes northwards towards Xewkija where it links with the Xlendi Bay complex by the Xlendi Bay-Xewkija Fault. This syncline is cut by several faults downthrowing south.

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The ix-Xini - Ghajnsielem - Qala Fault, which reaches a maximum throw of about 400 feet south of Nadur (3688), tectonically separates south-eastern Gozo from the rest of the island. Between Ghajnsielem (3587) and Qala (3887) Upper Coralline Limestone on the southern, downthrown side successively abuts beds between the Lower Coralline Limestone and the Blue Clay. Other minor faults, mainly striking NNE, E or SE proceeding westwards, cut the various formations which crop out along the coast.

2. Northern Malta

Northern Malta is dominated structurally by large normal faults striking ENE which divide the region into horst and rift blocks which are reflected topographically in ridges and valleys. The main units from north to south are, the Marfa Ridge, Mellieha Isthmus, Mellieha Ridge, Mizieb Valley, Bajda Ridge, Wied tal-Pwales, and the Wardija Ridge which passes south into lower land around Bingemma. The Ghallis region (4978) forms a separate shallow dome to the south-east. This area is bounded to the south by the cliff-like face of the important Victoria Lines Fault between Fomm ir-Rih and Madalena Tower. With the exception of the Ghallis region, where Lower Coralline Limestone and Globigerina Limestone have wide outcrops, the Upper Coralline Limestone has the largest outcrop and older formations are seen mainly around the coast.

The Upper Coralline Limestone of the Marfa Ridge dips north and is truncated to the south by a major fault, downthrowing at least 350 feet south, which introduces the Mellieha rift valley. The southern fault of the Mellieha Valley must exceed 200 feet in throw. Several other minor faults affect both the valley and the ridge and they strike FSF or FNE. There are also a few minor dip faults.

The Mellieha Ridge varies in width from one mile in the east to half a mile in the west. A narrow fault belt, about 500 yards in maximum width, forms a southern boundary to the ridge and the downthrown Upper Coralline Limestone to the south underlies the Mizieb valley and gradually rises to the south to form the Bajda Ridge. The southern side of this ridge is limited by an important fault, downthrowing south, which passes from near the Naval Rifle Range (4077) to Rixawn Point (4578).

Wied tal-Pwales is a narrow rift only half a mile in maximum width, the southern boundary of which is marked by steep slopes along the line of a fault downthrowing over 200 feet north which passes NNE from Ghajn Tuffieha Bay (4076).

The country for two miles to the south is cut by several faults, mostly trending ENE, NE or E, but none are of great throw. The Upper Coralline Limestone here is gently folded, especially in the south against the Victoria Lines Fault where, at Bingemma (4374), an asymmetric syncline runs parallel with the fault.

The shallow dome around Ghallis to the east shows only minor faulting. Some of the faults strike ENE, others NE.

The Victoria Lines Fault, downthrowing north between 300 and 600 feet gives rise to a fault scarp which is perhaps the most striking single topographic feature of the islands. The fault strikes ENE and in the west it almost brings the Upper Coralline Limestone down to the north against Lower Coralline Limestone. The throw in general decreases to the east and near Madalena Tower (5276) the Lower and Middle Globigerina Limestone is downthrown north against low levels in the Lower Coralline Limestone.

3. Central and Southern Malta

South of the Victoria Lines Fault numerous faults cross the country striking NE, but they do not form a dominant topographical control as they do to the north. Here the most important structures are large-scale gentle folds.

An anticlinal belt consisting of three main upwarps crosses central Malta from north to south between Mosta (4873) and Ghar Lapsi (4864). To the west, a broad structural low centres beneath some of the highest ground. To the east, the broad, rolling Globigerina Limestone country forms a wide basin around

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

133 Valletta which gives way, in the extreme south-east, to southerly dips. The only important dislocation is the Malak Fault at Ghar Lapsi which strikes NW and downthrows south-west at least 800 feet.

The westerly structural low brings the top of the Lower Coralline Limestone less than 100 feet above sea level between Qiejgħa (4072) and Baħrija (4171). But the region is very much complicated by shallow folds and faults. There is a general structural rise to the south-east, however, and this culminates near ta'Żuta (4566) where the top of the Lower Coralline Limestone is over 300 feet above sea level.

The main north-south anticlinal belt through central Malta was first recognised by Sir Edward Bailey. It is not, however, a simple ridge but forms several upwarps. The main domes are around Naxxar (4974), near Żebbuġ (4970) and north-east of Ghar Lapsi (4865). The first and last of these domes brings the top of the Globigerina Limestone over 400 feet above sea level.

The broad Valletta basin which centres on the Grand Harbour must carry the top of the Lower Coralline Limestone a few hundred feet below sea level. To the north the structures rise to give the outcrops of Lower Coralline Limestone north of Sliema (5574) and to the west they rise towards the central anticlinal belt. To the south-west the rise culminates near Żurrieq (5265) and to the south, after rising to give the Lower Coralline Limestone inliers near Zabbar (5870) and Kospikwa (5771) the strata dip regularly to the south-east. Younger and younger strata are therefore regularly exposed in that direction and the highest beds, the Upper Globigerina Limestone, crop out on the peninsula of Delimara Point (6064).

The Malak Fault at Ghar Lapsi (4864) downthrows the Upper Coralline Limestone at least 800 feet to seaward. The fault strikes NW and forms a conjugate association with the more usual NE or ENE striking faults. The fault plane is well exposed, and dips steeply seaward. The fault between Ta Berwiek (4864) and Deub il-Bagdal (4964) is double, enclosing a thick sliver of Globigerina Limestone.

The Age of the Faulting

The faults of the islands form prominent scarp faces and in many cases the actual fault planes show up as walls marked with original slickensiding. This suggests that the faulting must be quite recent. Indeed, Pleistocene Mollusca have been recorded in a crushed conglomerate caught up in the Malak Fault. [172] The neolithic cart tracks which enter the sea at St. George's Bay, Birżebbuġa and other places show that there has been even more recent movement of the islands.

114 This account is based in part upon a field survey of Malta and Gozo carried out at the expense of British Petroleum Company Ltd., in March-April, 1955. The geologists engaged in the work, in addition to the authors, were Dr. M. H. P. Bott and Dr. A. A. Wilson, also of the Durham Colleges' Geology Department. The authors acknowledge their indebtedness to the Directors of the Company for permission to publish this summary. In addition visits were made in 1958 and 1960.

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B. RELIEF AND LANDFORMS

133 The Maltese Islands, though they cover an area of only 120 square miles and reach a maximum height of little more than 800 feet, show great diversity of relief and landform. Thus detailed description and study involve the identification of a large number of regional divisions. The brief account which follows seeks to describe and analyse relief and landforms, and makes no attempt at full explanation of their origin and development since no detailed geomorphological work has yet been carried out in the islands. Furthermore, it has been found necessary to omit all mention of a large number of minor relief features which, though apparently insignificant when seen on the map, have had a decisive effect on the human occupation of the land, as will be shown in the sequel.

Briefly, the physical landscape of the Maltese Islands may be said to be composed of the following major elements:-

1. Coralline Limestone plateaus, which form the highest areas and are bounded by well-marked escarpments. These uplands range in size from the massive triangular plateau of western Malta to the tiny pinnacles of north-western Gozo.
2. Blue Clay slopes which separate the plateau uplands from the surrounding areas and which also occur in valleys cut into the plateau edges.
3. *Rdum* or 'undercliff' areas, occurring where the coralline plateaus meet the sea.
4. Flat-floored basins which in most cases are the result of faulting (e.g. Wied tal-Pwales) or downwarping (e.g. Binġemma Basin) but which are sometimes due to erosion and subsequent alluvial deposition (e.g. Wied il-Għasel).
5. Globigerina hills and plains - large areas of gently sloping land which, in Malta, take the form of a series of low ridges and shallow valleys but which, in Gozo, have a more varied though none-the-less subdued topography.

MALTA (Fig. 3)

The main island falls readily into two parts along the Victoria Lines fault, this major structural feature being marked by a well-defined escarpment which runs along the whole breadth of the island from Ras ir-Raheb (3973) to the coast (5277) north-east of Għargħur. The height of the escarpment decreases towards the east where, however, it becomes more abrupt. The Naxxar-Għargħur hills (xvii) are separated from the Wied il-Għasel (ix) lowlands by a precipitous drop of 150 feet, while in the west, the slopes down to the Binġemma Basin (xi) are appreciably gentler. The scarp face is broken by a series of deep embayments, of which the Wied tal-Baħria (4073), the Santi (4272) and Binġemma (4372) gaps in the west, the Wied ta'l-Isperanza (4875) in the centre and the Wied Anġlu (5076) and Wied id-Dis (5176) in the east are the most prominent. Only one of these, the Wied ta'l-Isperanza, makes a complete break through the Victoria Lines, and that an extremely narrow one. (Plate I.)

In the area south of the Victoria Lines, the major topographic divisions are clearly marked. To the west, the Coralline Limestone plateaus stand at heights of 600 to 800 feet and give way eastward through an irregular escarpment to the undulating areas developed on the less resistant Globigerina Limestone and lying for the most part below 400 feet. The western plateaus (xiii and xiv) are fretted on all sides by deeply incised valleys which have cut back into the upland to give it an extremely irregular outline. The south-western edge has been least affected by such action, and the regular line of cliffs are broken only in one place, where the wied complex of l-Imtahleb (4270) forms a deep embayment. Beneath the seaward edges of the plateaus lie the *Rdum* lands.

On the east is a series of valleys carved by streams descending to the central plains. From north to south, these are the Wieds il-Hemsija (4571), tal-Merħliet (4670), ta'l-Isqof (4669), il-Luq (4668), ix-Xagħri (4667) and Girgenti (4667). These valleys form deep depressions, their floors lying some 200 feet below the plateau spurs which separate them, spur and valley floor being connected by sweeping slopes developed on the Blue Clay. (Plate II.)

1: Bowen-Jones et al. K-5 (1955-1958) 1961

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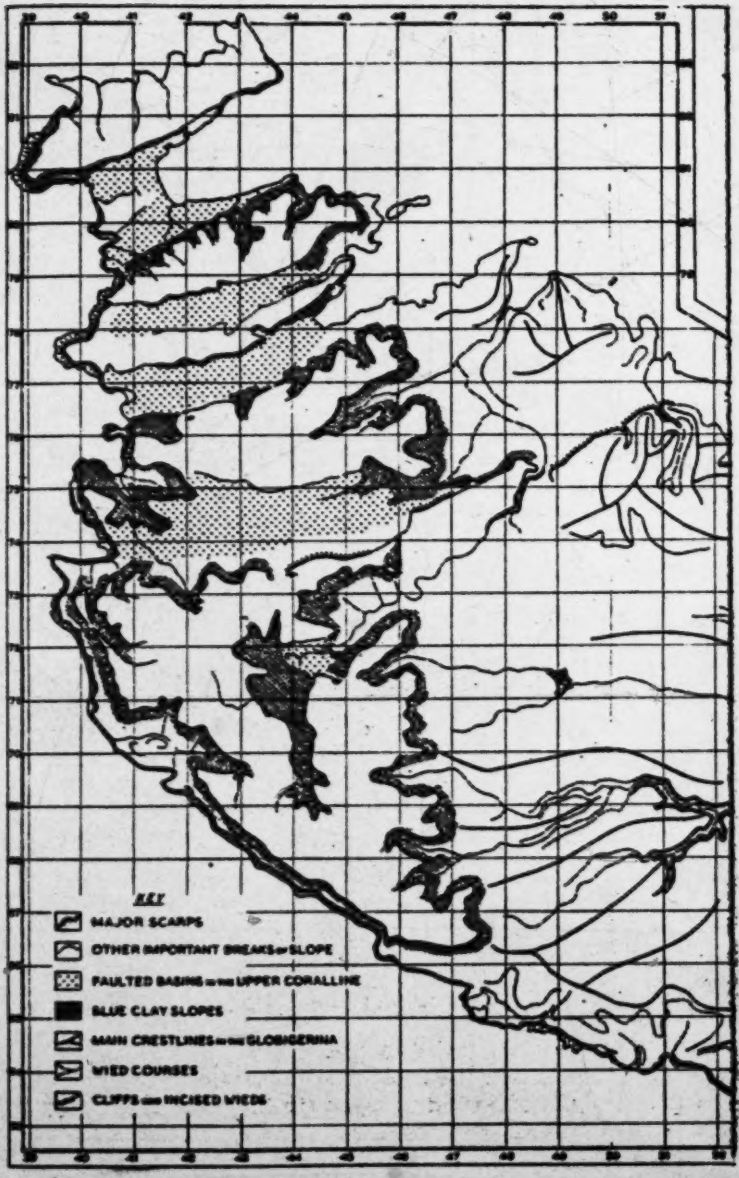

[p. 35-A]

Fig. 3 Physiography of Malta

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Fig. 3
Physiography of Malta.

[p. 35-B]

133 The plateau itself is divided into two parts, the Santi-Binġemma (xiii) and Rabat-Dingli (xiv) Uplands, by the Blue Clay Basin (xv), an interior depression drained by the upper Wied Qlejgħa and its tributaries Wieds Għomor (4372), Għemieri (4371), il-Busbies (4371) and l-Iemu (4470) which converge towards the narrow outlet north-east of Fiddien Bridge (4471). The undulating, rocky surface of the plateau contrasts vividly with the valley and basin lands which surround and penetrate it, not only in landform, but also in the character of the human imprint.

The Naxxar-Għargħur Hills (xvii), though forming part of the Globigerina Limestone area of Malta, are sufficiently distinctive to warrant their inclusion as a major sub-division of the island. From their smooth and rounded summits at heights of 400 to 450 feet, the land falls away in convex slopes eastwards and southwards to the coast and to the Lija-Msida valley respectively. Several small valleys cut sharply into the surface but these are a good deal narrower than those of the Coralline plateaus described above.

The Central (xviii) Southern (xix) and Eastern (xx) regions are for the most part areas of gentle relief (Plate III), but even here the terrain is by no means featureless, and steep slopes occur in a number of places. West of a line running in the general direction Pawla (5569)-Luqa-Mqabba-Qrendi (5165), a series of ridges and valleys leave the Coralline plateaus of the west and the hill lands of the south to converge towards Marsamxett and Grand Harbour. Thus the Naxxar-Għargħur Hills are succeeded southwards by the Lija-Msida Valley which in turn gives way to the low upswelling of the Attard-Hamrun Ridge. This in turn falls away to the open valley of the Wied is-Sewda, bounded on the south by the Żebbuġ (4969) Ridge. Beyond this are the Wieds il-Beqqiegħa and il-Ħesri, the Siġġiewi Ridge and the Wied Silani. In their upper courses, the three last-named valleys form gentle depressions rather than well marked troughs, but where they converge in the Wied il-Kbir complex (5269) they are sharply incised to depths of 100 feet or more below the general level before they open out again in the alluvial Marsa lowland (5470). The southern edge of this region falls to the the sea in a line of cliffs only slightly less impressive than those further west (Plate IV). While the cliffs themselves are rarely more than 100 feet in height they are backed by steep slopes rising to a crest line which runs parallel to and less than a mile from the coast. The height of this crest-line declines eastwards from a maximum of 450 feet to about 150 feet south of Kalafrana.

East of the Pawla-Qrendi line mentioned above, the general relief trend is from east to west. Ridges running from Ricasoli (5772) to Żonqor (6169), from Żabbar (5870) to il-Bidni (6069) and from Żejtun (5868) to il-Ġżira (6168) are separated by the Wied il-Għajn and ta'Mazza depressions, these features all converging towards Marsaskala Bay (6169). Further south, the convergence of ridges and valleys is towards Marsaxlokk. This arrangement gives an undulating character to the area, and steep slopes are confined to the coasts of Żonqor and Delimara and the Wieds ħas-Saptan and Dalam. The latter are both incised into the Lower Coralline Limestone.

Thus the landscape of the Globigerina areas is one of low ridges and valleys, and level land is very limited in extent, occurring only around the head of Marsa Creek and in the ta'Qali and Luqa (5268) airfield districts.

NORTHERN MALTA

The area north of the Victoria Lines fault is the most accidented section of the island, containing both the steepest slopes and largest expanses of flat or near-level land in Malta. Here, a major subdivision occurs along an irregular line running from St. Paul's Bay (4678) to Mosta (4874), which separates a western zone, where the Coralline cap rock has been preserved almost intact, from a smaller eastern area from which it has been entirely removed.

The eastern area falls into two sections of roughly equal size. The low upswellings of the Għallis Hills (x) and the Qawra Peninsula (viii), though their summits stand at less than 200 feet above sea level, are clearly defined topographic features, quite distinct from the broad, flat-floored, alluvial lowland of the Wied il-Għasel and its tributary the Wied ta'Għajn Rihana (ix). The latter

'[see page 46—Analyst]

[Text continues on page 38]

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Plate I. Wied ta l'Isperanza. North of Mosta the valley cuts through the Lower Coralline fault-scarp of the Victoria Lines.

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Plate II. Western edge of Upper Coralline Plateau. Spring. Foreground: ramped fields on Blue Clay slopes. Middle distance: Girgenti orchards and gardens. Background: Upper Coralline karst.

133 region stretches nearly two miles inland from Salina Bay (4878) and lies for the most part at heights below 50 feet, being abruptly terminated at its southern end by the escarpment of the Victoria Lines Fault.

The remainder of northern Malta consists of a series of fault-guided blocks and basins which, by comparison with the rest of the island give this region an almost mountainous appearance. From north to south, the major divisions are: the Marfa Peninsula (i), Mellieħa Isthmus (ii), Mellieħa Ridge (iii), Miżieb Depression (iv), Bajda Ridge (v), Wied tal-Pwales (vi), Wardija Upland (vii) and Binġemma Basin (xi) (Plate V). Important local features are, however, ignored in this simple statement.

The Marfa Peninsula (i), which reaches a maximum height of 400 feet in the west, has its steepest slope on the southern side where it overlooks the Mellieħa Isthmus and Mellieħa Bay in an abrupt fault-line scarp, the height of which decreases from 400 feet in the west to a little over 100 at the eastern extremity. The slope northwards to the Comino Channel (il-Fliegu ta'Malta) is a gentle one, diversified by numerous small valleys.

The Mellieħa Isthmus (ii) is a compound feature in which northern and southern alluvial depressions - il-Għadira and il-Ħofra respectively - are separated by a low upswelling of Coralline Limestone which reaches a summit level of 200 feet near Ras in-Niexfa (4079).

The Mellieħa Ridge (iii) has been tilted from north to south so that its major escarpment, in which the Blue Clay outcrops, faces north over the isthmus and is breached by a series of narrow steep-sided valleys (Għajn Ingraw (4279), Wied Mellieħa, Wied Għajn Żejtuna (4379)) which form deep embayments in the scarp face. The ridge itself is a limestone plateau with a summit level of 400-450 feet declining eastwards to 300 feet or less in the Selmun - tal-Blata (4580) district.

The southern slope of the Mellieħa Ridge, though less abrupt than that on the north, is still well-marked and there is a drop of 200 feet in less than 300 yards to the Miżieb depression (iv). The latter is a narrow plain some 600 yards across and two and a quarter miles long with its lowest point about 100 feet above sea level. It narrows to the east and gives way to the Wied tal-Mistra (4478) where headward erosion from the Qala Mistra (4579) has exposed the Globigerina and Blue Clay and produced a valley whose floor lies less than 50 feet above the sea over a distance of one and a half miles.

The Miżieb depression is synclinal in structure and the southern limb of the syncline forms the gentler, northern side of the Bajda Ridge (v). The latter is another Coralline Limestone upland, but stands at heights (200-250 feet) a good deal lower than those already described.

A minor escarpment 50 to 100 feet high separates Bajda from the Wied tal-Pwales (vi), a flat-floored depression about half a mile wide which runs right across the island from Għajn Tuffieħa (4076) to St. Paul's Bay (4478). The highest point in this area is only about 75 feet above sea level and the greater part of the region is below 50 feet. With the exception of the Wied il-Għasel, this is the largest area of true lowland in the island. There is a marked contrast in landform between the northern and southern borders of this lowland. While the former is a minor escarpment rising directly to a limestone upland, the slopes of the southern sides are longer and less steep, passing through a zone in which patches of Blue Clay occur before attaining the summit of the Wardija Uplands.

The Wardija Uplands (vii), whose summits lie between 400 and 450 feet above sea level are the largest area of limestone plateau north of the Victoria lines and are more complex in detail than those already described. They are tilted from north to south so that their northern face is fretted by a series of north-flowing valleys but they have also been vigorously dissected along their eastern edge where the Wied Qannotta drainage system extends nearly to the Saliba crossroads (4476) and divides the eastern part of the uplands into northern and southern sections.

The dip slope of the Wardija Uplands leads south to the Binġemma Basin (xi), a flat-floored depression at heights of 250 to 275 feet. This region gives way eastwards through a well-marked break of slope (4575), to the upper Wied

[Text continues on page 39-B]

1:Bowen-Jones et al. K-5 (1955-1958) 1961
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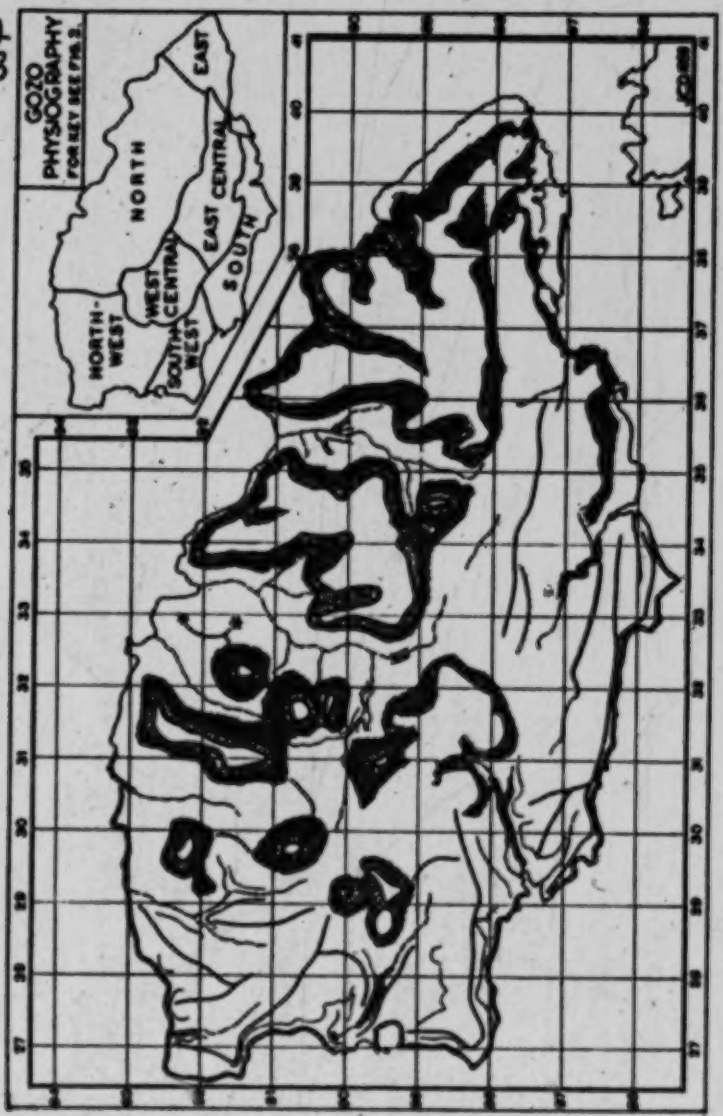

Fig. 4 Physiography of Gozo.

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1: Bowen-Jones et al. K-5 (1955-1958) 1961
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ta'Ghajn Rihana which is, in fact, incised into the basin floor. The basin is in turn flanked on its southern side, by the long slopes, developed on Globigerina Limestone and Blue Clay, which lead up, through a vertical distance of some 500 feet, to the Victoria Lines. 133

The Gnejna district (4175) requires separate mention since it forms an outlier of the Western *Rdum* ('Undercliff') Lands (xii), the main body of which lies south of the Victoria Lines on the seaward side of the Coralline plateaus. In Gnejna, vigorous erosion by two streams has exposed the Globigerina and Blue Clay to give a deep embayment in the Coralline edge comparable in landform to the Imtahleb embayment mentioned above.

GOZO (Fig. 4)

Though covering little more than one-third of the area of the main island, Gozo is topographically more varied than Malta. Two main features dominate the landscape: the fragmented plateau of Upper Coralline Limestone and the more low-lying plains and hills developed on the Globigerina. Between the two are sweeping slopes which mark the outcrop of the Blue Clay (Plate VI).

In the northern half of the island, erosion has broken the Coralline plateau into a series of disconnected fragments which diminish in size, but increase in height from east to west. The largest of these, the Nadur (3688) and Xaghra (3389) uplands, each cover an area of more than two square miles and rise to heights of 400-450 feet, thus occupying the bulk of the north-eastern part of the island. These uplands, like their counterparts in Malta, are penetrated by numerous, sharply-incised valleys whose slopes and floors alike are developed on the Blue Clay. These include the Wieds Daħlet Qorrot (3889), tal-Mistra (3790) and San Blas (3790) and the eastern tributaries of the Wied ir-Ramla in the case of the Nadur plateau, while the Xaghra plateau is cut into by the Wied tal-Pergla and the eastern tributaries of the Wied ta'Marsalforn. Where these two uplands reach the coast, *Rdum* or 'undercliff' areas occur, Blue Clay slopes descending steeply to the sea from beneath the bluffs which mark the edge of the limestone

[p. 39-B]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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133 outcrop. In the far north-east, however, between Dahlet Qorrot and Ras il-Qala (4087), the slope down to the sea is a good deal less steep and a rocky platform occurs where the Lower Coralline appears in a narrow belt along the coast.

The Wied ir-Ramla, which separates the Nadur and Xagħra Uplands, is a wide, open valley, whose gently-sloping floor contrasts with the steeper slopes which mark its upper edge and with the narrow enclosed valleys mentioned above. This valley carries northward, albeit at a lower level, the Globigerina plains of central Gozo and the same may be said of the still larger Wied ta'Marsalforn, which separates the part of the island so far described from very different areas to the west.

West of the Wied ta'Marsalforn, small and scattered fragments are all that remain of the Upper Coralline plateau. The north-western part of Gozo is essentially an undulating plain of Globigerina limestone into which the valleys are for the most part not at all sharply cut and above which clay slopes lead up to the numerous mesas. These, though small in surface area, are an impressive feature of the landscape, standing as they do 150 feet or more above the level of the surrounding plains. The largest plateau is that on which Żebbug (3191) stands and this is only about one mile long and 400 yards across at its widest point. The Żebbug upland stands more than 500 feet above sea level and is bounded on the east by the Wied tal-Qlejgħa and on the west by the Wied il-Għasri, the two largest valleys of the north-western region.

A line of hills, culminating in heights of over 500 feet in the Coralline summits of tad-Dabrani (3391), ta'Kuljat (3190) and il-Ħarrax (3190), separates the Wied Qlejgħa from the Wied ta'Marsalforn. Minor summits in il-Qolla s-Safra (205 feet/3392) and il-Miriuq (320 feet/3291) represent minute fragments of similar origin.

West and north of a line Żebbuġ-Kerċem (3088) - Ras id-Dwejra (2790), the Globigerina plains rise slowly to heights of 300-375 feet along the western coast where cliffs descend to the sea in a sheer drop of nearly 300 feet. In this region, too, numerous mesas such as Gordan (2992) and Għar Ilma (2989) occur, all standing more than 500 feet above sea level. The valleys of the Wied il-Għasri (3092), Wied il-Mielaħ (2992) and Wied ir-Raheb (2792) are broad, open and gently-sloping save in their lower courses where, over short distances, they have exposed and cut into the Lower Coralline.

In the Qawra (2790) - id-Dwejra - Wied Ilma (2889) area, complex faulting has led to the formation of a deep trough which separates north-western Gozo from the hill-lands of the south-west. The latter reach a maximum height of 528 feet near Ras il-Wardija (2688) and fall away eastwards to the outskirts of Kerċem where they stand at 350 feet. Markedly assymetrical in form, the Wardija hills slope gently north to the Wied Ilma but are bounded on their southern side by precipitous cliffs which in places are as much as 400 feet in height. Further east, this southern edge turns inland to overlook the narrow, fault-bounded trough of the Wied ix-Xlendi (2987).

The southern coastal area between the last-named valley and the Wied Mġarr ix-Xini (3486) is a second region in which uplands, in this case rising a little above 450 feet, are bounded on the south by a line of cliffs and fall away in gentle slopes northwards to the central plains. East of Sannat (3197), however, the ta'Ċenċ upland (3286) overlooks the central plains in a well-marked fault-line scarp some 50 feet high, along which a narrow outcrop of the Lower Coralline occurs.

East of Mġarr ix-Xini, a change takes place in the character of the southern coast. Inland, faulting has preserved a large area of Upper Coralline from beneath which the Blue Clay outcrops to form the seaward slopes. Thus Rdum it-Tafal (3686), Wied tal-Mġarr (3687) and tax-Żewwieqa (3787) are similar in character to the coastlands of the north-east.

Near and to the east of Qala (3888), a southward extension of the Nadur plateau is flanked on its southern side by a fault-shattered zone in which the detailed arrangement of landforms is extremely complex. Blue Clay valleys, of which the Wied tal-Qala (3887) is the largest, run south to the coast and are separated by promontories and lines of cliffs.

The areas so far described enclose the central region of Gozo. This area, though by no means devoid of variety, is the least accidented part of the island.

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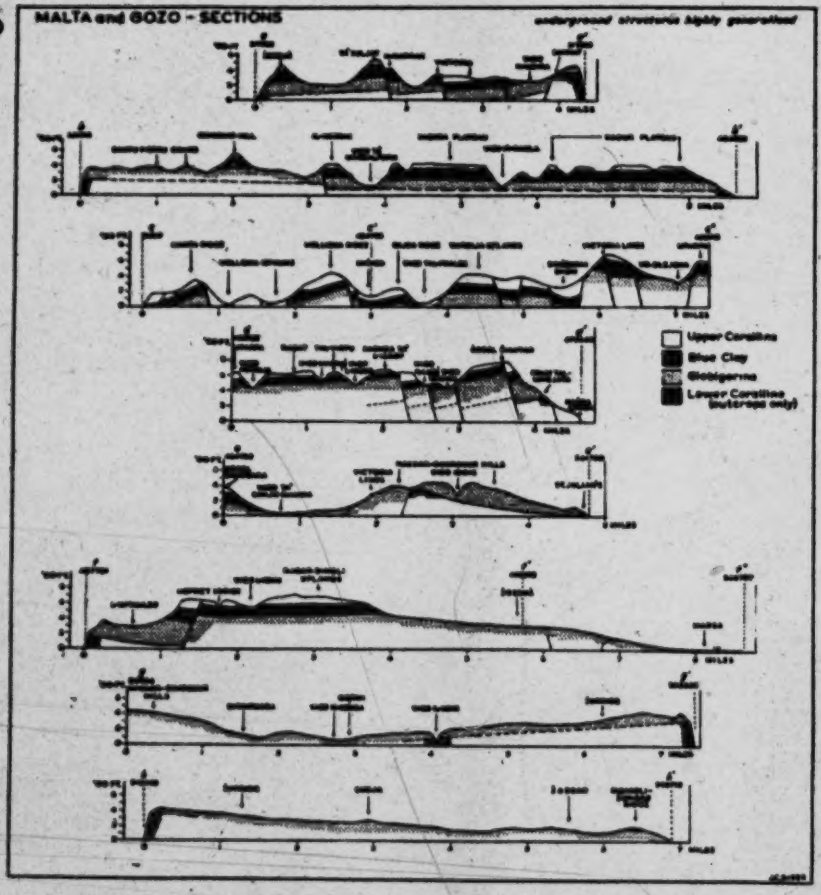

Fig. 5 Sections, Malta and Gozo.

West of Rabat, il-Gelmus (479 feet/3189) separates the Żebbuġ-Rabat basin, drained by the upper reaches of the Wied ta'Marsalforn, from the San Ġorġ basin (3089), whose outlet is via the Wied tal-Lunzjata (3188), to the Wied ix-Xlendi. These basins, whose lowest points are at 250 and 175 feet respectively, rise gently to low cols on which stand the villages of Għasri (3090) and Santa Luċija (3989). Rabat itself is sited on a low elevation of Upper Coralline, flanked on its eastern side by a minor escarpment beneath which unusually gentle clay slopes occur.

The area between Rabat and Għajnsielem (3687) is an undulating district lying at heights between 275 and 350 feet. The Xewkija (3387)-Għajnsielem Ridge, which is fault-bounded on its southerly, steeper side, is a recognisable topographic feature, though it rises but little above the general level of the area. The ridge is flanked on either side by plains of which the one to the north is

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●133 the most uniform. To the south, the slight incision of the Wied Hanżira (3387) gives somewhat steeper slopes, though here again relief is very subdued. No topographic break occurs where, to the east, faulting has preserved the Upper Coralline, and the central plains continue unchanged across the structural boundary until they fall away to the Wied Biljan (3787) and the Wied tal-Mġarr which run down to Mġarr Bay.

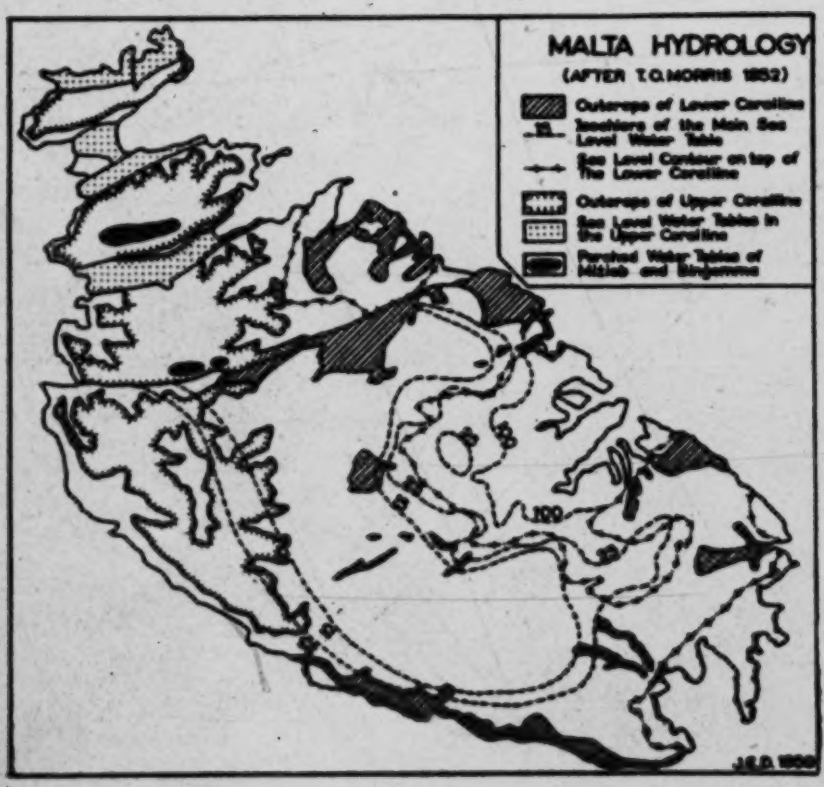

Fig. 6 Hydrology of Malta.

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Plate III. The Central Plains. Summer.
Foreground: summer vegetable cultivation. Middle distance: carob trees on valley side.
Background: Wied is-Sewda and Qormi village.

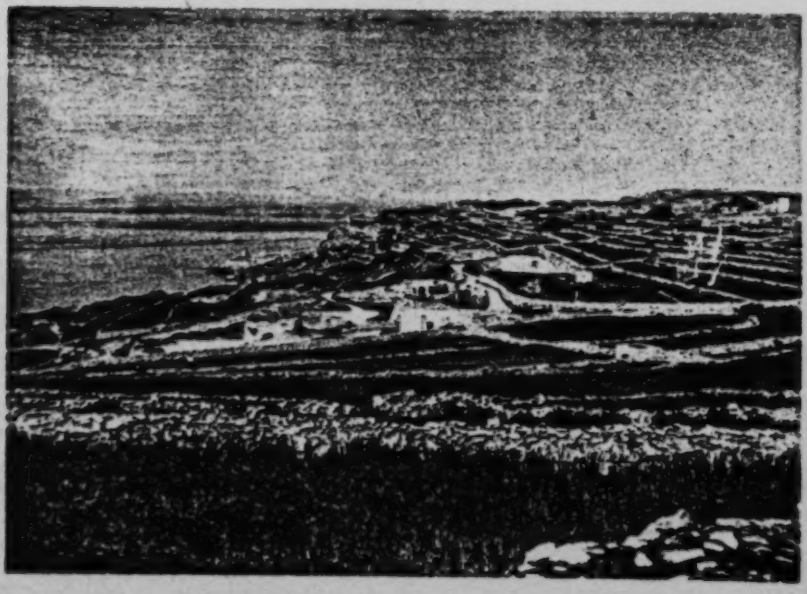

Plate IV. Cliffs south of Zurrieq. Spring. Narrow, terraced fields.

thus of surface temperature regime. However, soil profiles show virtually no difference between different sites, and it is only in exceptionally wet locations that the normal pattern of aridity is sufficiently overcome to allow the development of noticeable humus horizons. 132 134

In the past there have been broad oscillations of climate responsible for the production at different times of widely differing soil materials such as the 'red soil' (red brown Terra clays), stoney calcareous debris and aeolian sands which are now the materials parent to the present soil. The present climate, however, is not a leaching climate.

This uniformly arid climate is in strong contrast with that of some other latitudes, for example, that of Britain, and suggests itself as the reason for the restricted range of soils found in Malta and Gozo.

PARENT MATERIAL

The rocks which are ancestors to the soils are all closely similar in type chemically, and only moderately variable in physical characteristics. Thus only a limited range of soil types is to be expected. However, the massive, well-jointed limestones have developed karst landscapes because they favour percolation and solution more than do the porous but nearly impervious finer-textured limestones. On the karstlands the red brown Terra clays have developed on almost completely de-calcified residues from the limestone, but on the other landscapes there has been a minimum of decalcification, and the soils are very like the rocks from which they have been formed. Thus, the composition of the impurities in the limestones from which they were originally weathered mainly decides the nature of the Terra soils (although inblown calcite has increased their calcium carbonate content). Similarly the texture and detailed composition of the carbonate raw soils and xerorendzinas is closely dependent on the parent material. The parent material type is therefore important for Maltese soils because it partly determines what pedological processes can take place and especially because the processes taking place now have little effect. 133 134

TOPOGRAPHY

Topography generally influences the development of the soil in a variety of ways, and chiefly through modifications of climate, variable conditions of drainage and effects on erosion and transportation processes. It has been noted that in Malta and Gozo the variations of topography produce sites with very different insolation conditions, but the effect on soil processes is negligible. It is only in the extremely freely-drained conditions of some hill tops, where lime crust yermas are simulated on parent materials of fine sandy loam texture that the effect of topography on drainage conditions can be thought to be sufficient to produce soil modifications. Flooding with sea water may be attributed to topography, and in the Alcol series at Salinas, for example, slight salinity is the result.

The effect of topography on erosion, transportation and deposition is more noticeable. Under former cooler climatic conditions, solifluction took place, and under the present conditions sheet or gully erosion occurs during the violent showers of late autumn. The result is that there are strikingly different eroded and alluvial phases of the same soil series in some locations. On the Blue Clay soils the alluvial, light clay type is more favourable to agriculture than the eroded heavy clay type which is in patches alkaline or saline-alkaline.

BIOLOGICAL INFLUENCES

Apart from man's activities, biotic factors are of relatively small importance in the soils. Humus horizons are only developed under well grown and long undisturbed vegetation, which is very rare. The organic-matter deficient humus forms of the surface horizons of the cultivated soils can only be seen easily under the microscope, and the soil fauna seems to be very limited in numbers. 134 311

The modifications of the soil pattern produced by man are, on the other hand most profound. Apart from the large area of Malta which has been covered by human habitations, factories, airfields and military installations, where the

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Plate V. Northern Malta. Spring.
From top left to bottom right: Bajda Ridge, Wied tal-Pwales, Wardija Upland, Binġemma Basin.

Plate VI. View north from the Citadel, Gozo. Spring.
Foreground: dissected Globigerina plain. Middle distance: Blue Clay slopes.
Background: Upper Coralline plateaux. (Żebbuġ church, left centre).

1: Bowen-Jones et al. K-5 (1955-1958) 1961

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[p. 98-B]

Fig. 28 Steepness of Slope (Malta).

1: Bowen-Jones et al. K-5 (1955-1958) 1961

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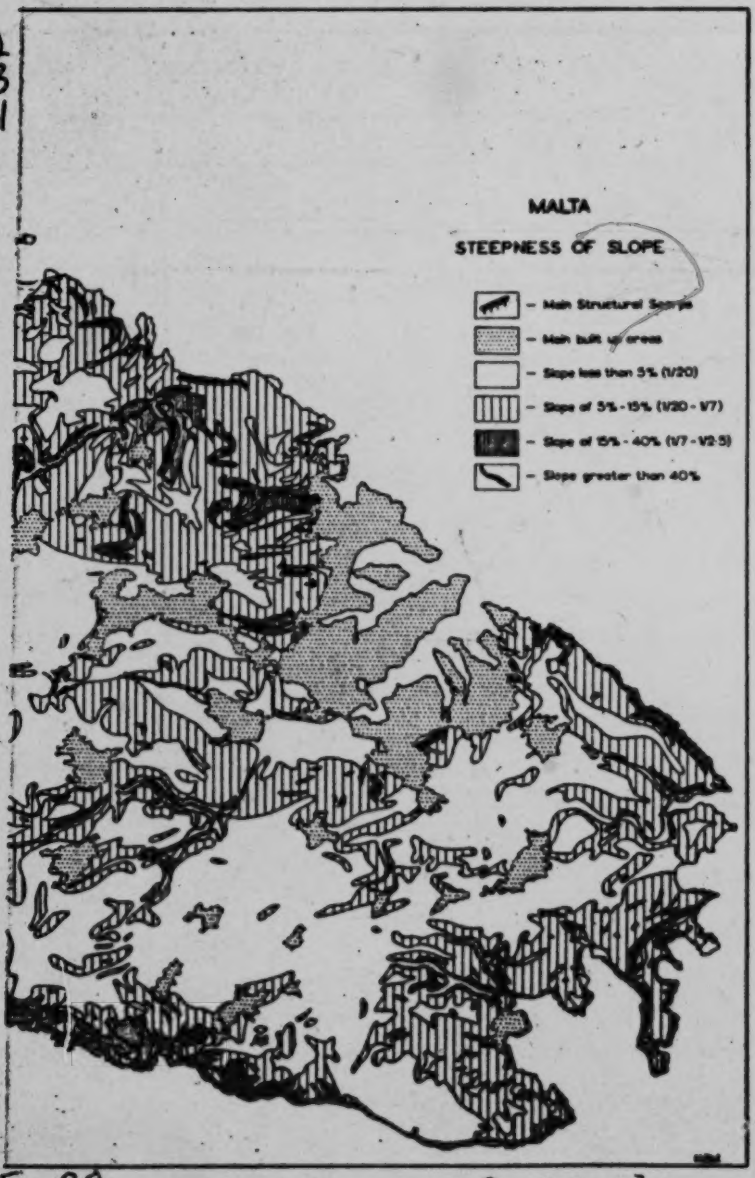

Fig. 28
Steepness of Slope (Malta).

[P. 98-C]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

B. Slope Analysis, Erosion and Tillage

The slope map (Fig. 28) is a further illustration of the regional variations in the physical landscape which were described in some detail in Chapter I. The most clearly marked feature is the division into Western Scarplands and Central and Eastern Hills and Plains. In the former, gently sloping land (slopes less than 1 in 20) is confined to basins and to a few very limited parts of the plateau uplands. Sharply accidented topography and thus steep slopes are widely developed in this region, reflecting its complex structure. Slopes of gradients ranging from 1 in 7 to 1 in 2.5 occur along the faulted edges of all the plateau blocks as well as in the zone of Blue Clay outcrops which separates them from the Globigerina lands to the east. The various uplifted blocks themselves generally have undulating summits with slopes between 1 in 20 and 1 in 7. In the Central and Eastern Hills and Plains, the position is reversed. Over these parts of the Island gently sloping land (gradient less than 1 in 20) covers at least half the area and really steep slopes (greater than 1 in 7) are confined to coastal cliffs and a few valley incisions, the latter case being particularly widespread in the Naxxar-Gharghur hills.

There is, however, no simple correlation between steepness of slope and the presence or absence of cultivation. Indeed, the greater proportion of the land shown on the map as having a gradient greater than 1 in 7 is in fact still under the plough. The distribution of waste and abandoned land, occurring on plateau summit rather than scarp face, is a function of rock-type, exposure and various social and economic factors (see p. 227) rather than of gradient. That gradient only in extreme cases sets absolute limits to the extent of cultivation is illustrated by the Rdum zone of the south-west coast where, in the Rdum ta'Dingli and the Rdum tal-Lunsjata, intensive cultivation is maintained in land whose average gradient is greater than 1 in 2.5.

Though gradient has little direct effect on the pattern of farmland and waste, it obviously has much to do with the physical effort involved in maintaining a particular piece of land in cultivation. Even here, the control is by no means absolute. The problems of retaining a soil cover are much less serious in steeply sloping districts where thick, heavy soils are derived from the Blue Clay, than in areas of similar gradient where the parent rock is of Globigerina or Coralline Limestone. In the latter case, soils are thin and coarse, *'campi artificiale'* are frequently found and the soil, once removed, is not easily replaced either by natural or by human agencies.

The character of field boundaries illustrates this point. In Blue Clay areas they are generally low ramps rather than retaining walls, whereas in steeply sloping limestone areas, walls of great height and thickness are necessary to maintain a rudimentary soil cover. Field shape and size (see Fig. 68 and p.185) are also relevant. Long, narrow, ribbon-like fields are characteristic of steep slopes in limestone districts, while in Blue Clay areas fields are generally much larger, despite steep gradients.

The dangers consequent upon careless tillage and failure to maintain boundary walls are greatest on slopes steeper than 1 in 7, in areas where the soil cover is thin and is either artificial or derived from limestone rocks. The abandonment or neglect of a single field, the breaking down of a single wall quickly lead, in such areas, to damage above and below the neglected field and may eventually affect a whole flight of terraces, even driving away other cultivators who are unable to bear any increased load of maintenance work on their walls and fields. While outstandingly heavy storms can cause damage to land of all types (see p. 67), in areas falling within the category indicated above, constant vigilance is necessary at all times, both in the use of traditional methods of tillage and particularly in the introduction of new ones.

[P. 99]

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1: Bowen-Jones et al. K-5 (1955-1958) 1961
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Plate XIII. The Grand Harbour, Malta.

Plate XIV. Mgarr Harbour, Gozo.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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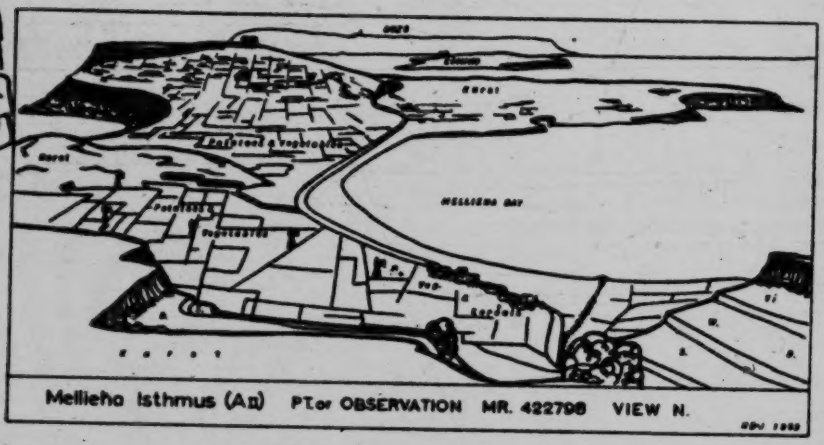

Fig. 103 Malta: Mellieħa Isthmus.

(8)*, id-Dahar (Fig. 102 B) above the Wied Ghajn Tuta (1), and in smaller scattered plots. It also occurs in the undercliff zones of Rdum tal-Qammieh (9)*. (significantly, 'Qammieh' means 'wheat-producing') and Rdum tal-Ahrax (10) where Blue Clay and Globigerina outcrop beneath the Upper Coralline scarp. A few small homesteads are sparsely scattered over these zones. In the small valleys which open to the north, such as Wied Musa (2) and ta'Maċċia (5) (Fig. 102 A), wind-pump irrigation and road development have allowed the introduction of commercial cultivation of potatoes and vegetables. Field boundaries have been recast, new farms built and cultivation extended on to former wasteland. The utilisation of these small oases is essentially precarious as sea-spray salinity on the one hand and ground-water salinity induced by over-pumping on the other set definite limits to productivity. Abandoned wind pumps mark points at which these limits have been over-stepped.

Thus in the region there occur simultaneously both slow abandonment of the harder lands and reclamation of especially favoured pockets.

A.II. MELLIEHA ISTHMUS (Fig. 103)

There are three separate areas of cultivation. Il-Ghadira (11) and il-Hofra (12), lying on either side of a barren karstic hill, are pump-irrigated for the production of potatoes and some summer vegetables. Good dry farming is represented by the marled slopes between Mellieha and the sea (13).

A.III. MELLIEHA RIDGE

Here, as in other, analagous regions, there is a natural association of central summit-lands with fringing valley embayments. In the west, rising in cliffs from the sea and more gently from the head of Miżieb, the ridge is almost entirely waste, although a few small plots of minor fodders and beans have survived abandonment. Near Mellieha, in contrast, small scale reclamation is extending an area of rather more intensive cultivation. This is associated with the rapid growth of Mellieha itself. Further to the east, topographic controls become dominant, cultivation, with one exception, being confined to the several depressions. Wied Imgiebah (19) is intensively cultivated in spring-watered high terraces near the cliffed coast. Further inland, where water is less plentiful,

*A number in brackets following a place name refers to Figs. 69 and 70.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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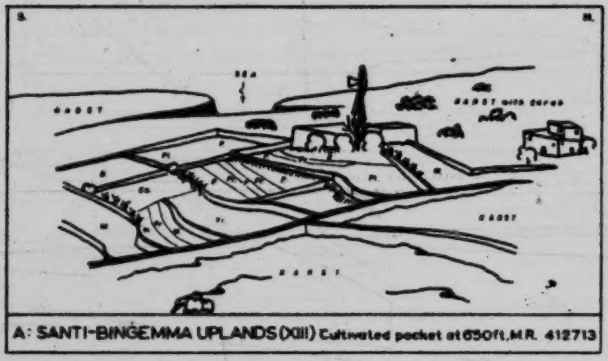

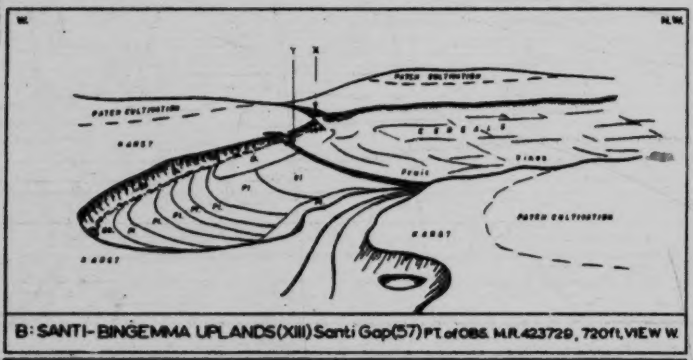

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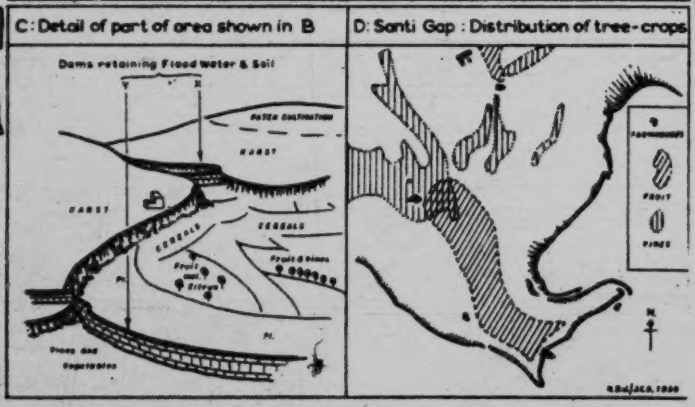

Fig. 107 Malta: Santi-Bingemma Uplands.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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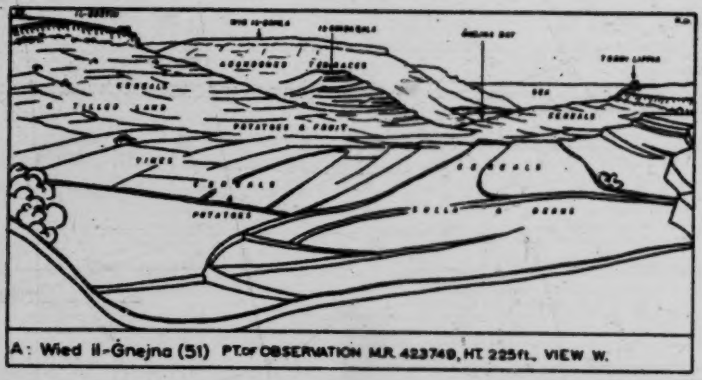
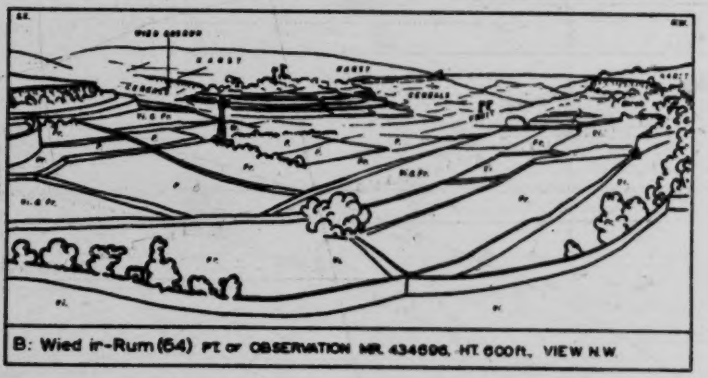
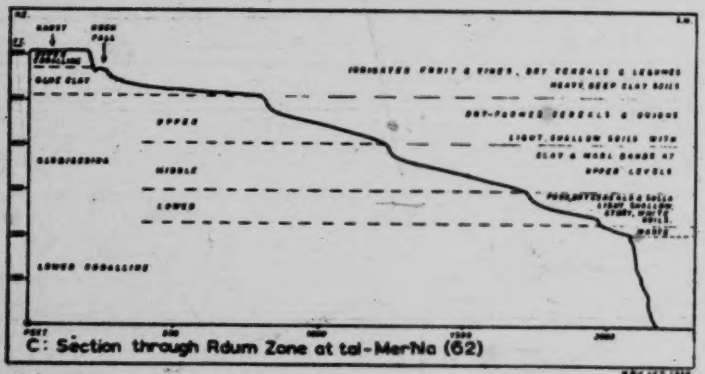


A: Wied il-Gnejna (51) PT. OF OBSERVATION M.R. 423749, HT. 225ft., VIEW W.



B: Wied ir-Rum (64) PT. OF OBSERVATION M.R. 434696, HT. 600ft., VIEW N.W.



C: Section through Rdum Zone at tal-Mer-Na (62)

Fig. 109 Malta: Western Rdum Lands.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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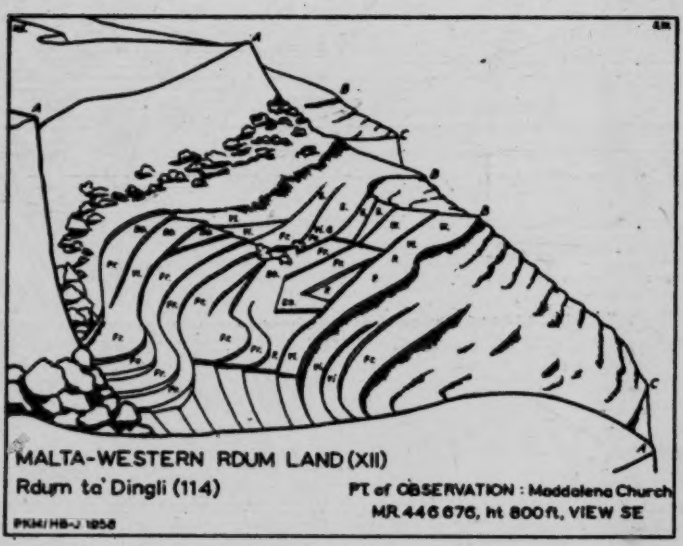

Fig. 110 Malta: Western Rdum Lands.

as, for instance, in the Rdum ta'Dingli (114) (Fig. 108), the cultivation of steep, narrow terraces between formidable cliffs represents a desperate clinging to limited resources. In others, great embayments such as Ġnejna (51) (Fig. 109A), l-Imtahleb (63) and Wied ir-Rum (64) (Fig. 109B) offer greater and more easily realised opportunities for specialised farming. In all cases in the *rdum* zone is found a cross-section of the complete geological sequence found in the Islands and this exerts a close control over topography, hydrology, soil-formation and land use. Ideally, and as may be seen at tal-Merħla (62) (Fig. 109C), belts of cultivation lie between the Upper Coralline scarp-cliff and the sheer sea-cliff of the massive Lower Coralline. Zonal differentiation is otherwise controlled by the incidence of springs from the Upper Coralline cap, by differences in gradient and by minor variations between the different beds within the Greensand, Clay and Globigerina series. Although the aspect of the *rdum* lands suggests exposure to strong westerly and south-westerly winds, in fact they often lie in a pocket of calm air below the main airflow which is deflected up and over the *rdum* belt by the high sea cliffs. As evidenced by terrace walls, cultivation has been more extensive in the past. Abandonment is still proceeding and is most rapid in areas which are either most difficult of physical access, e.g. Rdum tal-Vicarju (61), or most remote from settlement, e.g. tar-Raħeb (60) ('the place of the hermit').

The most simple type of *rdum* cultivation is exemplified in the narrow sea-facing zone including the Rdum Dun Nazio (80) and the Rdum ta'Dingli (114). Figs. 109C and 110 show the close inter-relationship between geology, slope and cultivation. Three major breaks of slope result from differential erosion. From the Upper Coralline cliff edge (marked A in Fig. 110) a steep cliff falls to a concave slope of gentler gradient on the Blue Clay and Upper Globigerina. Here, on the spring-watered terrace-retained mixed soils, typical *ġnien* crops are found. Below the break of slope B and on the steeper convex slopes of the Middle and Lower Globigerina beds lie a series of abandoned narrower and more inaccessible terraces. Points marked C indicate the line of the upper surface

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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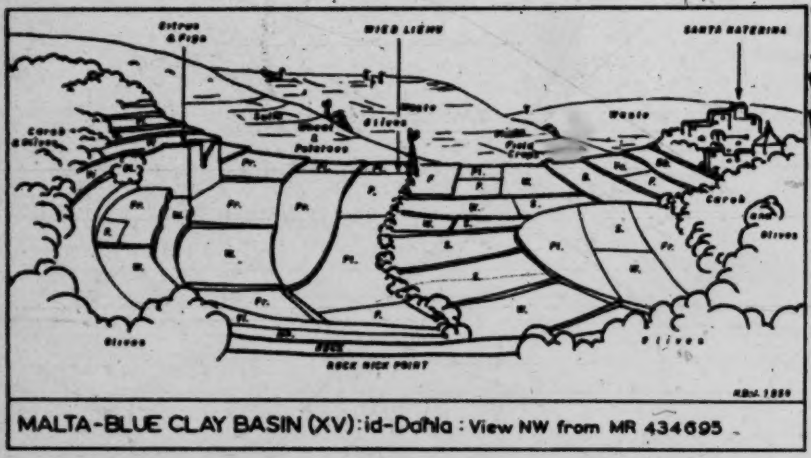

Fig. 112 Malta: Blue Clay Basin: Wied l-Iemu.

has, developed within it, the large solution hollow of Hofret ir-Rizz (75) (Fig. 111C). Bounded by a low Coralline cliff under which lie five farmhouses, and infilled with deep, red soils, this almost circular depression has often been erroneously identified as a circular fault. It is intensively cultivated for potato, vegetable and fruit crops and sub-division of the wind-pump irrigated land is extreme.

Around Hofret ir-Rizz lie dry-farmed fields of cereals and sulla interspersed with wasteland. The name of neighbouring Misrah tas-Suffara ('the open place of the whistle' - a possible reference to shepherds' pipes) gives an indication of the character of the open, non-irrigated upland here and over the remainder of the region, where dry-farming and *xagħra*-grazing areas are interspersed. Most of the eastern promontories of Xagħra ta l-Isqof (129) and Gebel Ċiantar are so used. Similarly, behind the Upper Coralline cliff overlooking the sea, extends an area of virgin karst, abandoned land and some small reclaimed plots. [103]

Between these more exposed lands are many small pockets, intensively cultivated under potatoes, legumes and a relatively large number of vegetables. The small, walled fields cluster around groups of wind-pumps and tanks as at ix-Xagħra ta'Swatar (Fig. 111A) on the Rabat Plateau (109). Irrigation water, extracted by wind- and motor-pumps, is available almost everywhere on these uplands. The density of pumps suggests that extraction is dangerously large (see also Chapter I C). Already in 1955 farmers in the tal-Pitkal district (82) were obliged to stagger periods of pumping and a large number of abandoned wind-pumps emphasise the hydrological instability. In 1956 the Maltese Government, in order to avoid such dangers, imposed a general ban on unlicensed well-drilling.

In this region, the urge to cultivate intensively results from the demands of Rabat as a consuming and marketing centre. At Busugrilla (105) (Fig. 111B) this is manifested in very specialised market-gardening around a flourishing hamlet which stands on the Fiddien road. Well linked by roads to the rest of the island, possessing in Mdina-Rabat the old capital which is still of considerable importance, and also carrying much dispersed and hamlet settlement, these uplands stand out from other Upper Coralline regions by reason of their more intensive land use.

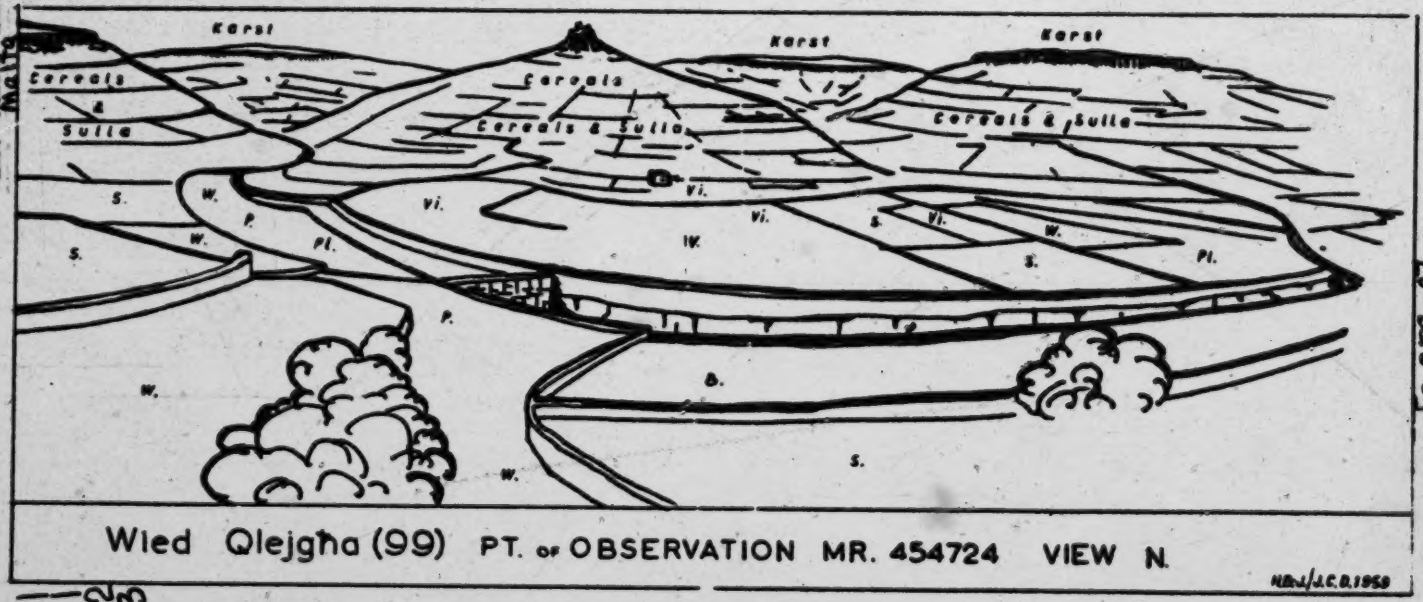

Fig. 114 Malta: Wied Qlejgha.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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large ramped fields (Fig. 114). This last zone merges with the open lands on either side of the Wied ta'l-Isperanza at the line of transition with the Central Plains. To the west towards Falka (93) and Besbesija, cereal and sulla fields rise to the Lower Coralline cliff-edge waste of the Victoria Lines.

At the junction of the Wied Qlejgha Region (XVI) with the Naxxar-Gharghur Hills (XVII) stands the gap-town of Mosta. This settlement has grown rapidly over the last 60 or 70 years so that it is now, both in size and population, the largest of the casals. This development is undoubtedly connected with Mosta's position. Controlling as it does the lowest gap in the Victoria Lines and sited where central and northern parts of the island meet, the casal has benefited from the expansion of commercial farming in the latter region. Improvements in communications and particularly the great increase in the use of motor transport over the last 30 years have also had their effect. The bridging of the Wied ta'l-Isperanza on the northern outskirts of Mosta has opened up a relatively easy route to Wied il-Ghasel and the north, a fact reflected in the way in which the more recent growth of the settlement has been mainly along its southeast-northwest axis in contrast with its previous alignment from northeast to southwest.

C.XVII. THE NAXXAR-GHARGHUR HILLS

These, the highest of the Globigerina hillylands, rise to over 400 feet and are dissected by a series of radially arranged, deep wieds. Aspects and slope are the main controls on agriculture in this region, though man-made features, particularly quarries, considerably affect the details of utilisation. The distribution of wasteland is largely determined by outcrop and gradient although the inter-relationship is by no means a simple one. Steep gradients themselves do not inhibit cultivation as is shown by the contrast between Wied l-Iklin (164) and the gentler slopes below tal-Balal (174). Similarly, exposure to northerly winds is far from constant in its adverse effects on farming, witness the cultivated heights immediately north of Gharghur, contrasting with the much-abandoned, though more sheltered Wied Ghomor (173). The most continuous belt of waste extends along the Victoria Lines, including the narrow northern scree slope and the wider ridge-top developed on Lower Coralline rocks. Viewed from the sea, the bare, grey cliffs at Madelena and Gebel San Pietru (154) appear impressively stark. The southward discontinuous extension of wasteland between Mosta and Naxxar is closely coincident with the Lower Coralline outcrop. However, on these gentle, sheltered slopes, the close proximity of the two major casals has encouraged the maintenance of land in cultivation, potatoes being widespread. This is one of the very few districts in which a relatively high

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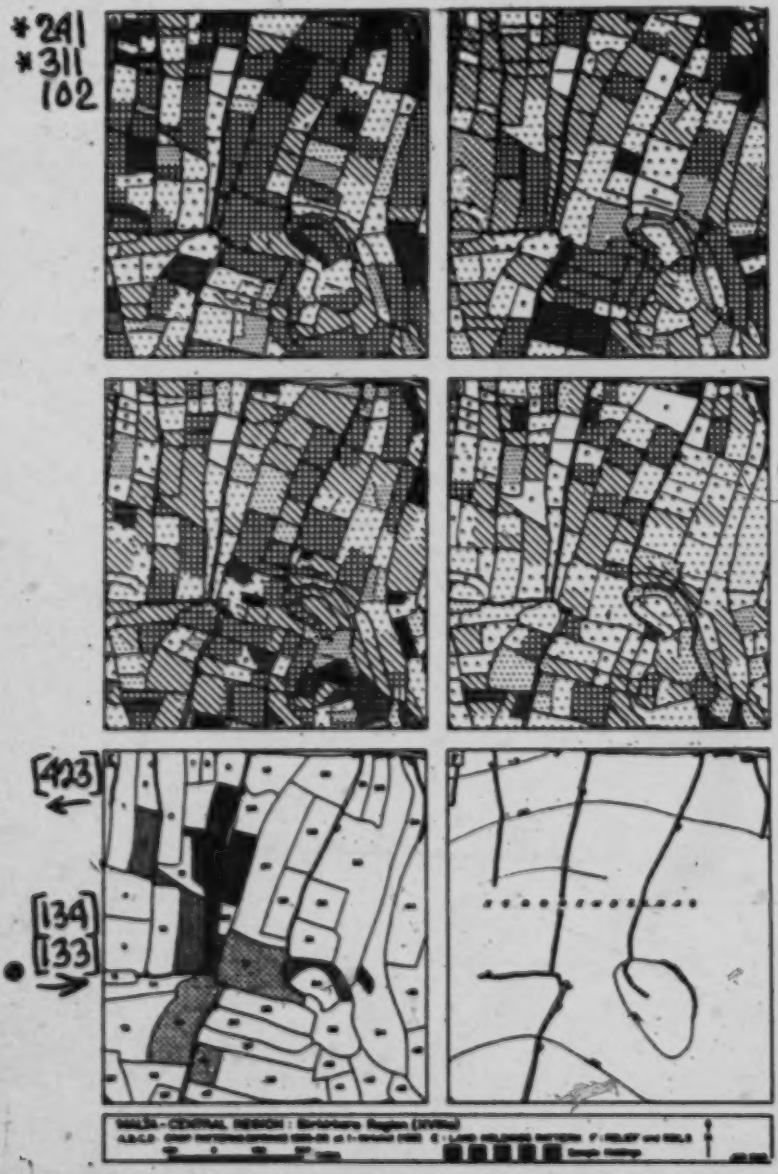

Fig. 116 Malta: Central Region: Birkirkara Region.

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Fig. 121 Malta: Southern Region.

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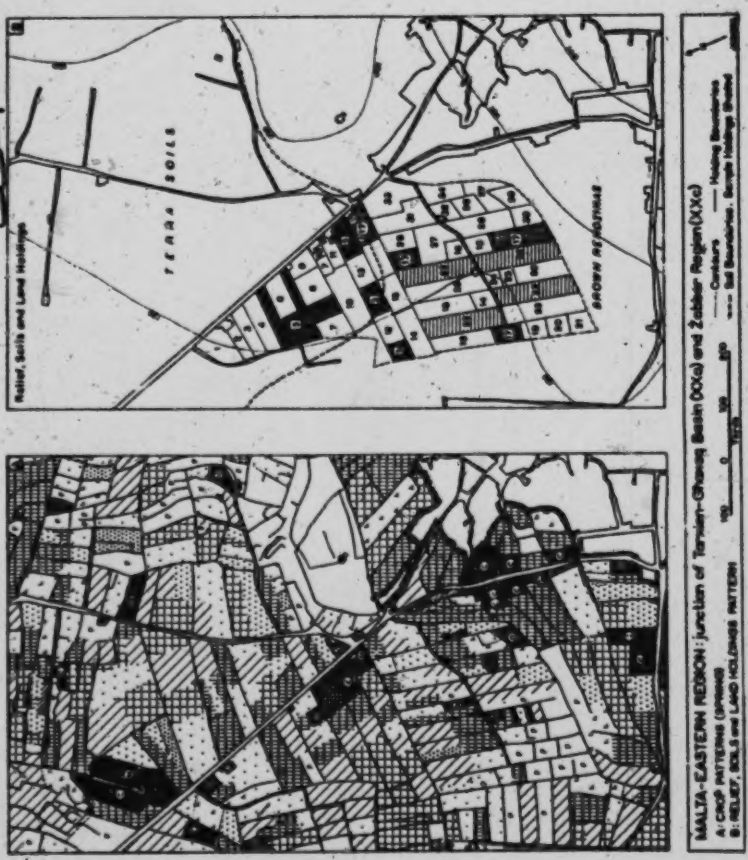

Fig. 122 Malta: Eastern Region: Tarxien-Ghaxaq Basin.

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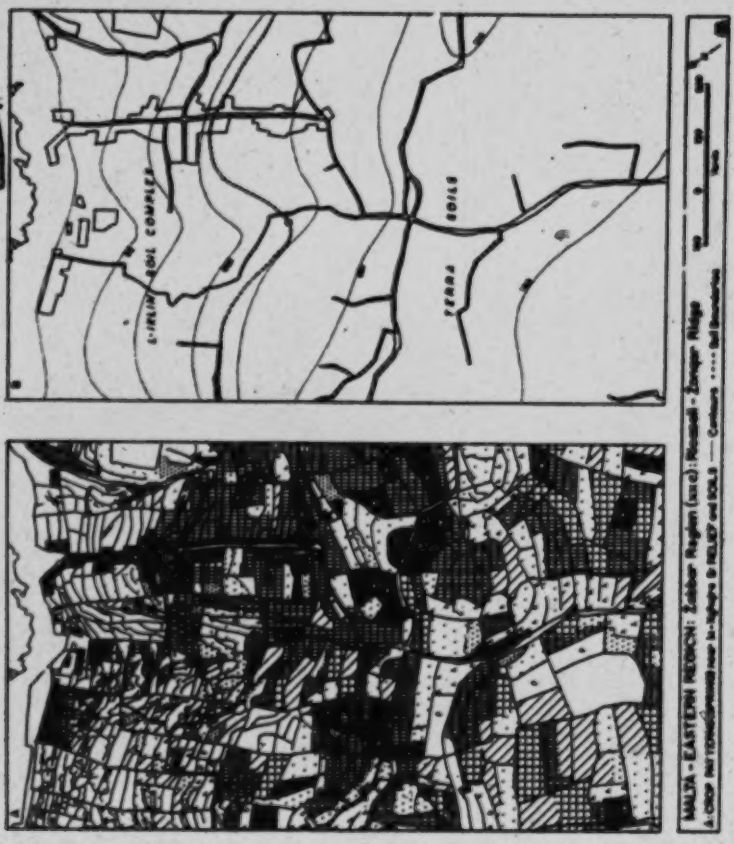

Fig. 133 Malta: Eastern Region; Zebbug Region.

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Fig. 124 Malta: Eastern Region: tas-Silġ Delimara.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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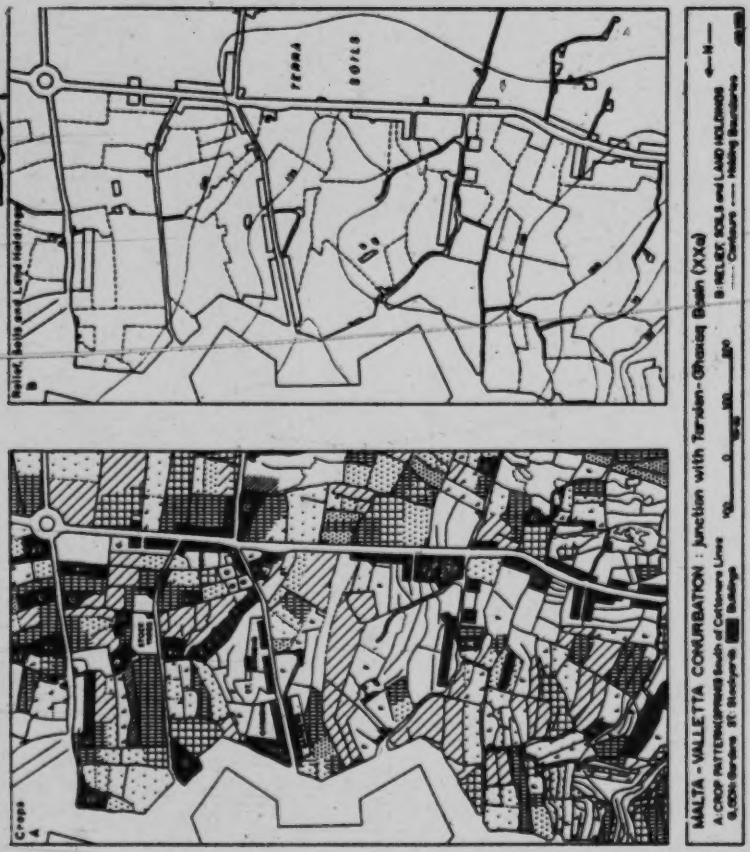

Fig. 126 Malta: Valletta Conurbation.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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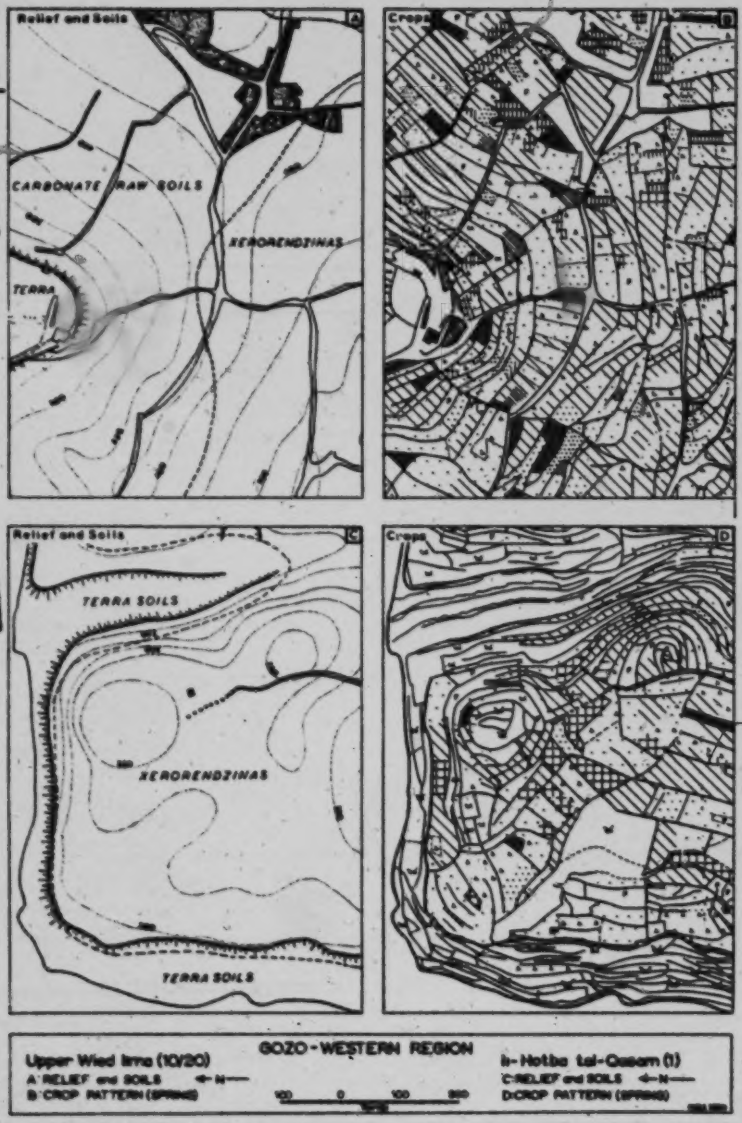

Fig. 136 Gozo: Western Region.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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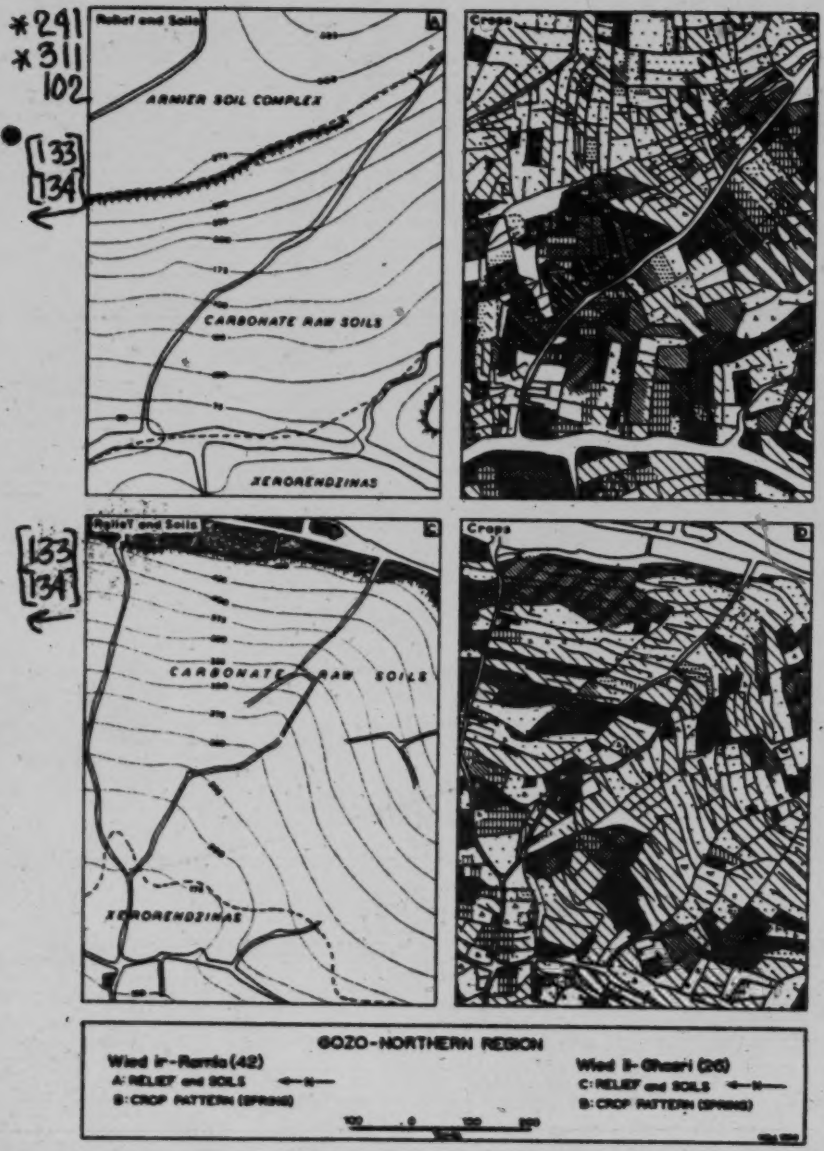

Fig. 127 Gozo: Northern Region.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
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are among the most intensively worked, reflects the lower intensity of pressure on land in Gozo.

Topographically, the Wied ir-Ramla (42)(Fig. 128B) is similar in type to the Wied ta'Marsalforn. The wied channel becomes progressively more sharply incised downstream before opening out into the sandy, bay-head lowland (from which the valley takes its name: *Ramla* = sands). Tributary wied embayments cut into the Coralline plateaus on either side.

Below the mesa scarps there are the usual *ġnien* zones and these give way downhill to a belt of sulla and cereals on the heavier, drier parts of the Blue Clay outcrop. On the eastern slopes lying below the Qortin tan-Nadur (48), recent and Quaternary sands, whose presence is marked by light, ochre-coloured soils, occurs a specialised zone of early tomato and cucurbit production and viticulture (Fig. 127 A and B). This relatively intensive pattern of land use extends from the scarp on to the eastern half of the lower valley floor. On the remainder of the main valley floor, mixed cultivation in which vines and sulla predominate is diversified by relatively large-scale potato-growing and some fruit production. The floors of the tributary wieds il-Ġgantija (43) and il-Ħanaq (44) are characterised by particularly intensive viticulture which merges into flanking zones of cereals and sulla. The small mesa of in-Nuffara (45) has similar characteristics to those of the western Coralline fragments.

The remaining part of the Northern Region is closely associated with the village of Nadur. The plateau on which the latter stands (46) is composed of a series of flat-topped promontories (*Qortin*) which run north and north-eastward from the main ridge. These overlook the coast in a series of *Rdum* slopes and are separated by deeply incised wieds. The arrangement of physical features is reflected in the lay-out of settlement and communications. As in the case of Xagħra, a small urban nucleus gives way northwards to strings of farmsteads aligned along roads and tracks. The plateau top thus contrasts with the valleys, which have virtually no permanent settlement.

Land use on the main plateau ridge is semi-urban in character with gardens and stockyards. The *qortin* lands, though physically uniform, differ a good deal from each other in land utilisation. The higher southerly part of the Qortin tan-Nadur (48) is largely waste, but the lower northern bluff is remarkably well cultivated under cereals and sulla with occasional small plots of vegetables and vines. The two promontories of the Qortin il-Kbir (51), on the other hand, form the most extensive areas of karst wasteland in the whole Northern Region of Gozo. Similar contrasts exist between the two rdum areas lying below the *qortin* lands. The Rdum tan-Nadur bears a scatter of small enclosures of vegetables, fruit and minor crops. In this case, cultivation is similar in type, though not in intensity, to that of the Maltese 'undercliff' areas. The Rdum tal-Mistra (53), by contrast, is a rugged wasteland, the greater part of which has never been cultivated.

Piercing the plateau on its northern side are three deep and sheltered valleys: Wied San Blas (50), Wied tal-Mistra (52) and Wied Daħlet Qorrot (54). These are characterised by the virtual absence of the common dry-farmed crops, which are replaced by a remarkably complex inter-cultivation pattern of fruit, vegetables and vines. This is the only area in Gozo completely devoted to intensive market gardening, the products of which are sold in Malta. The growing demand for early produce has resulted in the recent and continuing extension of the area under fruit and has encouraged experiments such as that of strawberry growing. The difficulties of transporting produce out of these deep valleys is offset by the advantage of proximity to the harbour of Mġarr. Thus the *ġnien* type of farming typical of plateau peripheries has here been extended downhill to the valley floors.

IV. THE EASTERN REGION

This comprises the Qala Uplands (55) and flanking coastlands (56) together with the narrow coastal strip which separates the East Central Region from the sea. Structure, topography and land use alike distinguish the Eastern Region from its neighbours. As a result of faulting, the pattern of rock outcrop is often

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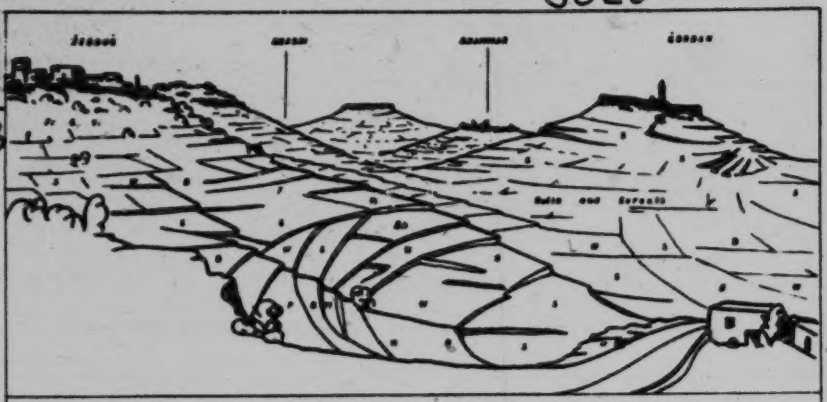
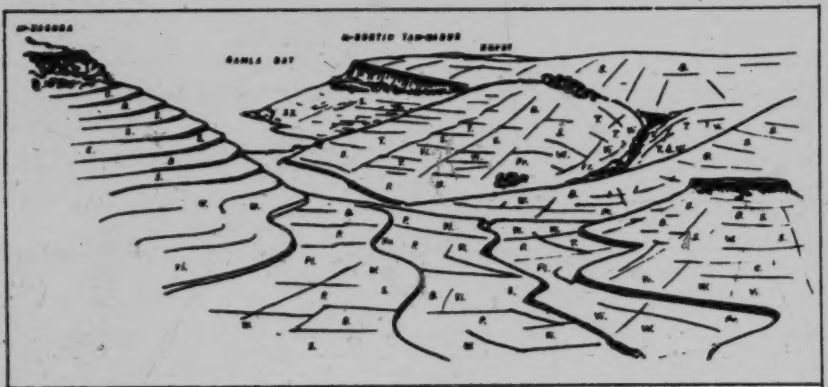
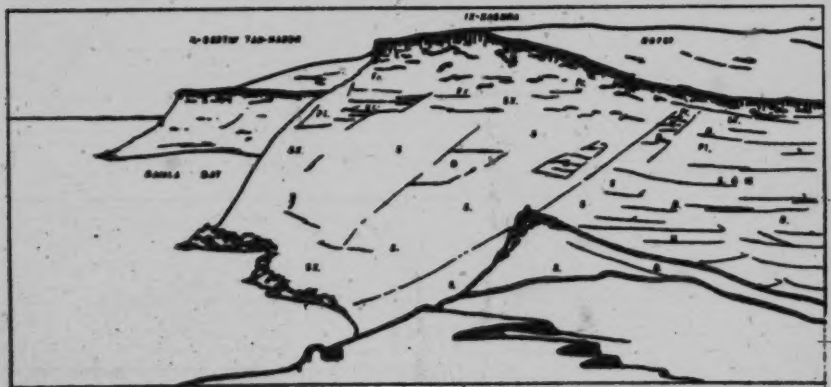


A: Wied il-Ghasri (26) PT. OF OBSERVATION M.R. 307930 VIEW S.



B: Wied in-Ramla (42) PT. OF OBSERVATION M.R. 350897 VIEW N.E.



C: Rdum tax-Xagħra (41) PT. OF OBSERVATION M.R. 343915 VIEW S.E.

[p. 280]

Fig. 128 Gozo: Northern Region.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6
Gozo

241* 311*

confused and seldom bears any simple relation to topography. In this region, many minor factors of soil, aspect and water supply produce local variations in the landscape, human as well as physical (Fig. 129 A, B and C).

Around the village of Qala, the upland is generally poorly cultivated. Fields of cereals and sulla are interspersed with abandoned areas and karst patches. On the Qala coastlands to the east the pattern of cultivation is clearly related to the successive outcropping of the various rock formations which are here, in contrast to the rest of the region, quite simply arranged (Fig. 129 D and E). The whole sequence from Upper Coralline to Lower is displayed in this district but there are few well marked breaks of slope, the whole forming a single slope from 400 feet to sea level. Immediately below the Upper Coralline summits, vines and fruit trees occur on the Blue Clay. Nearer the sea, a band of Globigerina is largely under cereals, sulla and legumes, this being succeeded by Lower Coralline wasteland fringing the coast.

The complex structure of the lands to the south of Qala is reflected in broken topography and a great variety of outcrop. South facing valleys in which the Blue Clay is exposed give way on their seaward side to a fragmentary platform developed on Globigerina and Lower Coralline limestones. The distribution of wasteland is closely associated with the outcrops of the latter formation. With the exception of the upper Wied tal-Qala (58), where good, well watered soils carry fruit, this district is one in which small enclosures of the whole dry crop assemblage lie among rocky hill wastes. Standards of cultivation in this somewhat inaccessible part of the island are generally low and abandonment is proceeding. By contrast, the slopes above Mgarr Bay, extending eastwards to include ta'Zewwieqa (60) are, on the whole, more intensively worked. In this steeply sloping area, unusually small enclosures have been established for the cultivation of fruit and tomatoes, while somewhat larger fields carry cereals and sulla. These patches of cultivation alternate with barren scree slopes. In the immediate vicinity of Mgarr (61), ill-tended minor tree crops such as carobs, figs and olives give a spurious impression of luxuriance. Mgarr itself is a fishing harbour and commercial port. In its latter capacity it belongs to Gozo as a whole rather to its immediate hinterland and through it passes all the trade between the two islands. Port facilities are limited and have acted as a brake on the commercial development of Gozo. Mgarr has little or no agricultural function and is overshadowed in size by its immediate neighbour, the farming village of Ghajnsielem. South of Mgarr, below Fort Chambray, the Rdum it-Tafal (62) is a typical Gozitan undercliff area with small enclosures, all rather ill developed, which carry some tomatoes, potatoes and fruit crops, among which there are numerous islands of rocky, carob-clad wasteland.

[504]

V. THE SOUTHERN REGION (Fig. 130)

The only unity possessed by this region is a result of its structural and topographical separation from the interior. The il-Hobz Coastlands (63) lie below a well-marked Upper Coralline scarp and are separated by the Wied Mgarr ix-Xini (64) from the Sannat and ta'Cenċ Uplands (67 and 66). The latter are an upthrown block of Globigerina and Lower Coralline Limestone, the northern edge of which is a clearly defined, interior-facing fault-line scarp. In the extreme west, the sharp incision of the Wied ix-Xlendi (70) divides the Southern Region from the Globigerina platforms of the west.

[33]

At il-Hobż (63) the karst edge of a low Upper Coralline cliff overlooks gentle slopes developed on Blue Clay and Globigerina. A narrow belt of spring-line fruit growing is succeeded downhill by open terraces and larger fields of cereals, sulla and other 'dry' crops. Much of the land is spring-tilled in preparation for summer vegetables. The seaward limit of these shelving slopes is marked by a break of slope below which lies a low Globigerina rock platform.

This simplicity of landform is abruptly terminated on the west by the fault-guided incision of the Wied Mgarr ix-Xini (64). Below the pumping station, steep slopes and exposure of the compact Lower Coralline beds have prevented cultivation. Coinciding with an upthrown block of the same rock type, wasteland extends into the lower Wied Hanżira and over the neighbouring, gentle slopes.

[TEXT CONTINUES ON P. 283]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6
Gozo

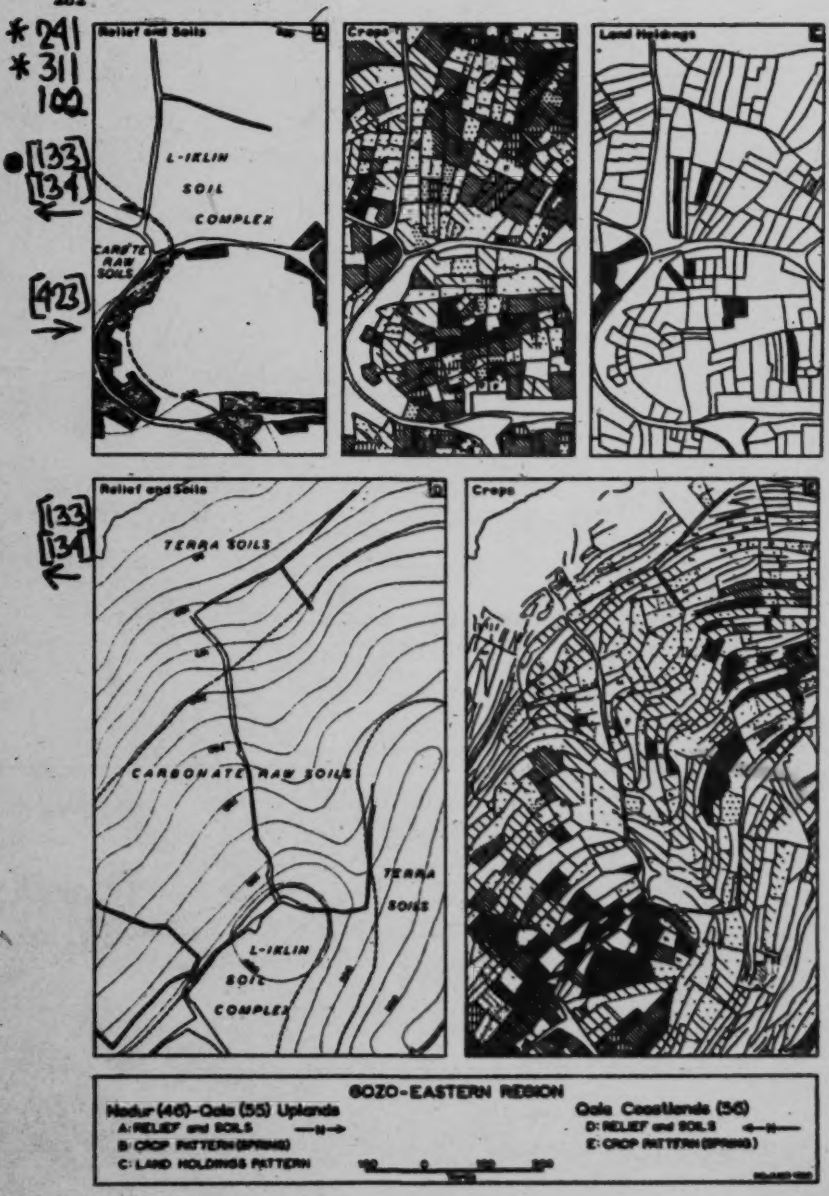


Fig. 129 Gozo: Eastern Region.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6
Gozo

The intractibility of the Lower Coralline rocks, a function of the extreme slowness with which they are attacked by the forces of weathering, is repeated on the ta'Cenċ Upland (66). Most striking is the contrast with cultivated outliers of the softer Globigerina beds. Thus it is the spurs on either side of the Wied is-Sabbar (65) rather than the valley itself which are cultivated, mainly under cereals and sulla (Fig. 130A). At ta'Cenċ, grey karst hills overlook the sea and contrast strikingly with the scarp foot basin to the interior. 24 31

The Sannat Uplands (67), also tectonically elevated, have retained a cover of Globigerina rocks and here cultivated fields extend to the edge of the high sea-cliff. South of Sannat village, these fields are geometrically laid out and are to be associated with enclosure accompanying the westward extension of village settlement on to the hills. A similar crop assemblage is to be found both here and in the less regular fields of the broken land to the west. These are districts of dry farming, cereals, sulla and legumes being the chief crops. In spring, following winter cropping and in preparation for some summer vegetable cultivation, many of the fields are newly tilled. A high water table is maintained in the shallow Globigerina beds by the underlying massive and relatively impervious Lower Coralline.

The western extremity of the Southern Region is marked by a return to barrenness. Incision along a shatterbelt exposes Lower Coralline rocks in the Wied ix-Xlendi (70) and the tributary wieds Munxar and tal-Bardan (69). Karst, usable only for *rughra* grazing, is but rarely broken by patch cultivation. The compact agricultural village of Munxar is divided by a Coralline gorge, at the head of which lie dense thickets of neglected trees. Above the small fishing village of Xlendi there is a small alluvial pocket devoted almost entirely to legumes. These two small patches are exceptional in an otherwise rocky wasteland area.

VI. THE EAST CENTRAL REGION

This region, as viewed from the surrounding hills, appears as a single basin. In fact, a central ridge separates two main depressions, a topographic division strengthened by the east-west alignment of a fault zone. The southern depression, that of the Wied Hanżira (73), is bounded to the north by a minor cliff with a narrow exposure of Lower Coralline rocks. The Xewkija-Għajnsielem Ridge (71) is in turn demarcated on its northern side by a sharp break of slope coinciding with a resistant bed in the Globigerina. This latitudinal graining of the land becomes blurred between Xewkija and Victoria, where the Victoria-Mġarr Depression (72) swings southward to merge with that of the Wied Hanżira. These regional subdivisions and their topographic characteristics are reflected in the field patterns (Figs. 131 and 132). 133

The sub-region identified as the Wied Hanżira Depression (73) includes the basin of the upper wied and the shelf which extends eastwards at the same level to Għajnsielem. In the west, between Sannat and Xewkija, lies a symmetrical, open basin of intensive dry farming. As shown in Fig. 131 A and B, there is a fairly regular arrangement of large but subdivided field. On the deep soils are grown a great variety of crops among which vines, cereals and sulla predominate. On the eastern shelf, the proportion of cultivated land diminishes, vines disappear and there is a great deal of fallow and grazing land. This change in crop assemblage is not associated with any topographic break but with a change in soil type and parent rock across a major fault. (See p. 31 and Fig. 2.) The only enrichment of the crop range which appears to result is seen in the greater importance of potatoes and onions. This may also result in part from the nearness of Għajnsielem and proximity to the main Mġarr highway.

On the central ridge, the poorest cultivation and the thinnest, least continuous soil cover are found at the western end and along the Lower Coralline exposure south-west of Xewkija. In general pattern, this village resembles the hill-top settlements of the North, with its farmsteads and gardens strung along a web of roads and tracks. South-east and east of the village, the ridge top is characterised by geometrically arranged, undivided fields, the largest seen in Gozo. Cereals, sulla and vines, grown in exceptionally large blocks, are the typical 34

[Text Continues on p. 289]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6
Gozo

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*311
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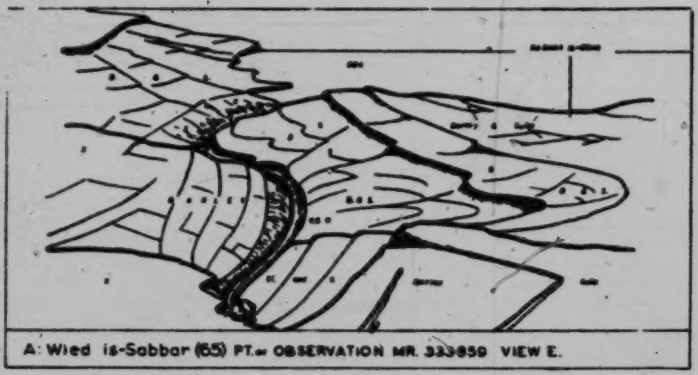
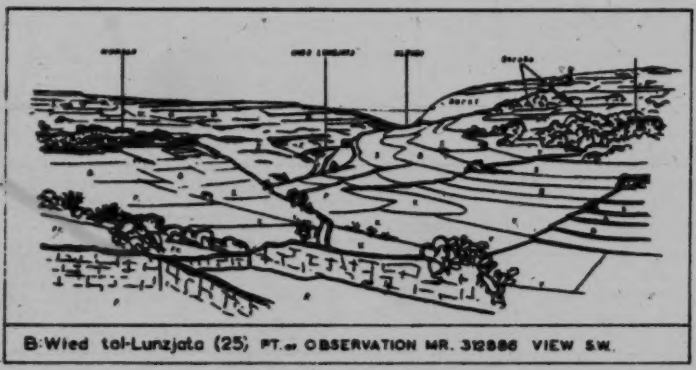
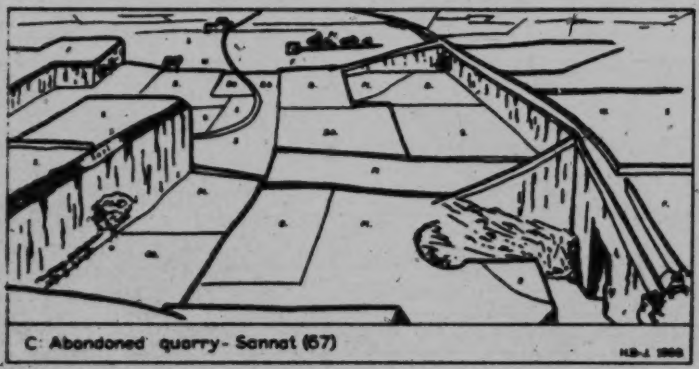


A: Wied is-Sabbar (65) PT. OBSERVATION NR. 333859 VIEW E.



B: Wied tal-Lunzjata (25) PT. OBSERVATION NR. 312886 VIEW S.W.



C: Abandoned quarry - Sannat (67)

Fig. 130 Gozo: Southern Region.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6
Gozo

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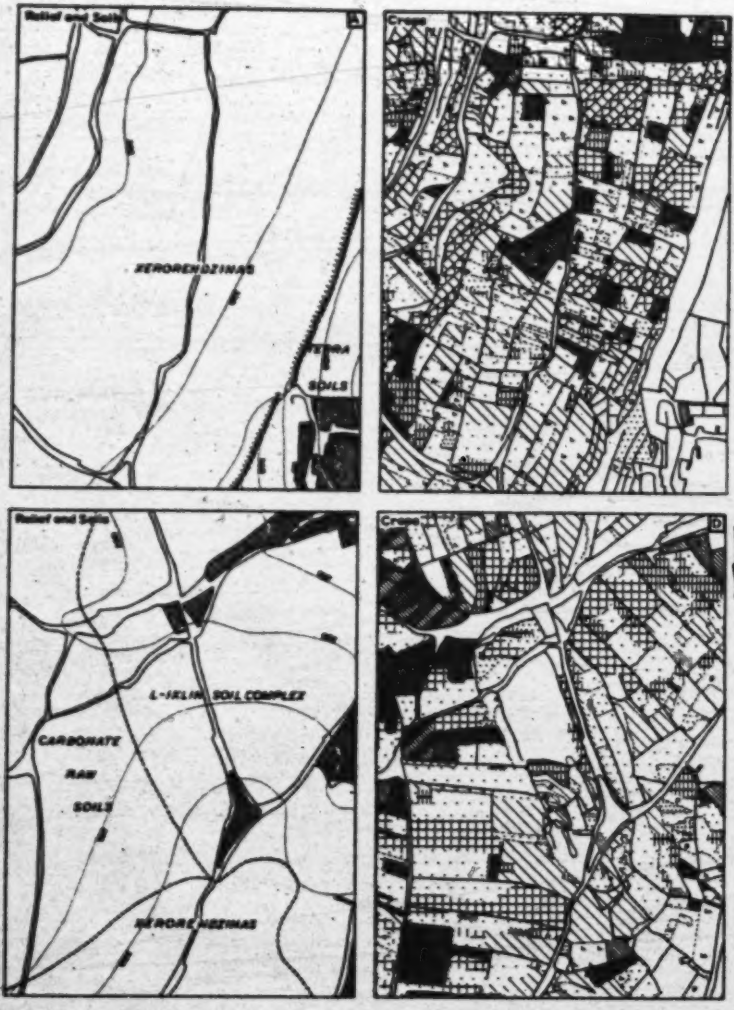
[133]
[134]



[133]
[134]

GOZO EAST-CENTRAL REGION

Wied Hantiru Depression (73)
Northern Outskirts of Sannat
A: RELIEF and SOILS
B: CROP PATTERN (SPRING)

Xewkija-Ghajnsielem Ridge (71)
Northern Outskirts of Ghajnsielem
A: RELIEF and SOILS
B: CROP PATTERN (SPRING)

Fig. 131 Gozo: East-Central Region.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6
Gozo

GOZO-EAST-CENTRAL REGION : Xewkija-Ghajnsielem Ridge (71) (Western end)

A: RELIEF and SOILS
B: CROP PATTERN (SPRING)
C: LAND HOLDINGS PLOT
Walls
Plot Boundaries

100 0 100 200
Yards

N

JCD/HB-J 1958

Fig. 132 Gozo: East-Central Region: Xewkija-Ghajnsielem Ridge.

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

This small agricultural entity, the Maltese Farm, is further split into a number of non-contiguous plots or parcels, each of no great size. In illustration of this and other related points a small area in Malta, square in shape with a side half a mile long, has been examined in some detail (Fig. 135). The area lies in the Central Region, between Siġġiewi and Żebbuġ, and includes in its north-eastern corner, part of the latter settlement. It is dissected by two steep-sided valleys, that of the Wied il-Beqqiegħa crossing from south-west to north-east, and the Wied il-Ħesri which appears in the south-east corner. Narrow, terraced fields follow the contours of the valley sides but, on the more rounded relief of the interfluve, the fields, although still terraced, become generally larger and more nearly square in shape. Apart from the valley-floors, used as foot- and cart-ways, with other accommodation roads and paths, non-agricultural lands are limited to a few house-sites in the outskirts of Żebbuġ. A few scattered patches of rock outcrop occur on the steeper slopes, but the only large patch of uncultivated land covers the north-eastern lobe of the large tenancy plot lying south of the area shaded black in map. The remaining land is devoted to dry farming crops characteristic of the region.

LAND TENURE (Fig. 135A)

The underlying topography, clearly influences the shape, and, to a lesser extent the size of the tenurial plots. This is most striking in the north-eastern quadrant, where long, narrow plots reflect the sinuous terraces of the Wied il-Beqqiegħa; on the slopes of the Wied il-Ħesri, however, the relationship is scarcely apparent. Shallower gradients are covered by plots of fuller and more varied shape differing greatly in size. In the north-east corner small and oddly shaped tenancy parcels are clearly related to the nearby settlements and are mainly specialised garden plots. An anomalous area of small plots in the opposite corner breaks up the general tendency of increasing size away from the casal.

Tenancy units are small in size, but there is enormous variation. The average of the parcels shown here, including parts of parcels beyond the limits of the area mapped, is slightly less than 5 *tmien* The smallest garden plot (*b*, north-east corner) contains about one-twentieth of a *tmien* of land, while the large plot of fieldland in the south (*z*) is about 50 *tmien* in extent. There may be a tendency for plots to be larger in areas where soils are thin and poor, but the two distributions can certainly not be equated.

Of the 129 plots, parts of which lie within the half mile square, 57 are held by farmers with no other land in the area. But the remaining 29 holdings each have two or more non-contiguous parcels. This relationship is indicated by the use of distinctive shading in the case of Sample Holdings II and V, and otherwise by the letter *a* to *z* and *d*. Holding *b* (six plots) scattered throughout the northern two-thirds of the area is an extreme example of the typical parcellation.

LAND OWNERSHIP (Fig. 135B)

In general terms, within the area shown here, the distributions of ownership and of tenure are similar. As shown in Fig. 135B, there are many scattered plots belonging to the same owner, a characteristic which might be termed fragmented ownership. A similar cartographical convention to that used in Fig. 135A is adopted here. Plots owned by the same private owner are indicated by the letters A-J (I is excluded); the numbers 1-4 are used similarly for the various classes of ecclesiastical ownership. All plots, whether duplicated or not, belonging to the latter class, which includes monastic, episcopal, and parish land, as well as land owned by Charitable Institutions (a very small proportion in this area), are distinguished by a special system of shading as also are Civil Government lands. The rather special cases of ownership by the occupier or by his parent are also distinguished from the bulk of the parcels which are owned by other private persons.

Looking at the distribution in its basic form, as a simple pattern of parcels, ignoring the various special relationships, several points emerge. As in the map of tenure, there is a complex network, but the weave is generally coarser,

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

SECTION IV Chapter XI

An Assessment of the Cultural Landscape

In this book we have attempted to portray the Maltese Islands 'in the round'. Deficiencies and omissions occur; the former unfortunate, the latter equally unfortunate but also deliberate because of space limitations. Nevertheless, we believe that our study, such as it is, has illustrated certain points of value. First, and this is a geographical truism, the relationship between man and the land on which he lives is infinitely complex. In the case of Malta this relationship is also astoundingly complete and coherent, so that alteration in any one part may provoke repercussions on all the rest. Hence, under these circumstances, change of any kind should be introduced with extreme caution; it has been demonstrated that lines of action which seem apparently well-found and reasonable at the time of inception can have wholly unforeseen and unintentional consequences. This warning has a general as well as local validity. Further, and in the light of this situation, it becomes essential to have as full a knowledge as possible of local conditions before undertaking action. Such knowledge can only be acquired through observation, which must be as complete and detailed as financial resources allow.

Thirdly, investigation of the use man makes of his surroundings leads to the conclusion that, in a last analysis, it is not the actual physical conditions which control man's activities - it is the view that man himself takes of what can or cannot be done which really matters. From the physical standpoint Malta is a highly typical Mediterranean country, yet we still do not know why the vine and the olive, these most characteristic plants, have hitherto only made temporary invasions of Malta. We do however know that the factors behind this were not physical - e.g. climate or to do with soil. It would thus seem to be the way man actually estimates the physical potentialities of his home region that governs what takes place - put in another way, we may say that environment finally exists only in the minds of men. In such a form it can appear intractable, offering insuperable obstacles, and mysterious in its effects. Hence, resource use should not be thought of solely as a routine controlled by physical media, but as a process in which temperament and attitudes of mind are involved. Recognition of the human factor as indissolubly associated with the physical elements of geography underlies our approach: and it is in this sense that our subtitle 'Background to Development' should be interpreted.

Lastly, there is an opportunity to draw together some of the threads which we have unravelled from the general weave, and summarise the main themes.

The principal conclusion is that everything one sees in Malta, other than the major topographical features, is man-made and man-maintained in existence. For this reason there is an unstable equilibrium that eternally threatens to collapse.

Physical environment is fundamentally harsh. The component rocks consist almost entirely of fissured and fractured Tertiary calcareous series, mostly of Miocene age; and natural accumulation of relatively insoluble inorganic soil aggregates is very slow everywhere except on the narrow outcrops of the Blue Clays. There is complete absence of surface water and subsurface moisture is small. Only in the western half of the island do non-saline water-tables now rise near to ground level over appreciable areas, and only in one restricted area in the east - at Marsa - has this been even historically important. Malta has a highly accidented topography. The western half of the island is heavily faulted and forms a region of scarpland and faulted basins. The eastern area has more subdued relief particularly in its central and eastern parts, but even here the legacy of gorge formation - the dry wieds of Malta - during the humid late Pleistocene, and the small scale erosional etching of all major and minor geological and structural junctions have resulted in there being very little land of low gradient.

132 The Maltese climate is characterised by variability rather than by extremes. Most of the complex elemental combinations, as far as we can tell at the moment, tend to inhibit soil and plant development under natural conditions.

The annual precipitation average of 20.5 inches is largely meaningless - the variations from one year to another for each month in which there has been recorded any significant rainfall are all several times the mean values. Very high insolation and evaporation rates, from the end of April to the beginning of October, further reduce the effectiveness of scanty and variable precipitation. Much of the rainfall of spring and autumn is associated with violent frontal storms and is sufficiently concentrated in incidence to produce ephemeral torrents and cause considerable erosion.

Wind incidence is of peculiar importance. The maritime air streams are generally of high humidity and velocity. The dominant Northerlies, in particular the stormy *Majjistral*, with high humidity and relatively low temperatures, have a biological effect bleak enough to produce a very clear ecological pattern controlled by aspect and shelter. The soil line in the lee of the ridges which lie transverse to these North to West winds, rises higher to the south east with the cumulative sheltering effect. On a small scale, windbreaks of stones, wattle hurdles and even cereal hedges, become of importance. The *Xlokk* comes as a warm humid wind of usually sufficient velocity to force plant transpiration rates above the critical points. The occasional humid still air conditions in winter delay germination and encourage fungus diseases while all summer winds heighten evaporation rates and cause actual soil blowing.

One of the few biologically favourable climatic features is the absence of a thermal dormant season. Mean monthly temperatures are consistently above 50° Fahrenheit, frosts are very rare, and diurnal ranges small. On the other hand, the associated high summer temperatures even though ameliorated by sea breezes produce considerable physiological troubles in plants and livestock. It is significant that over 80 per cent. of the flora now found in Malta are of North African rather than European type.

133 In the absence of human interference Malta must have been, as it still is in many areas, largely a barren karstic waste relieved only by a few basins and plains such as the Wied tal-Pwales and the Wied il-Ghasel. On the hill and ridge tops Terra Rossa formation takes place in solution hollows. On all slopes with gradients greater than 5 per cent., and on all but the most wind sheltered flatlands corrasion and movement, often exposing great stretches of bare rock, are dominant. Only in a few basins, such as the erosional Wied ta'Mazza or the tectonic Bur Marrad in the Wied il-Ghasel, does deposition become important.

In this harsh environment man created the land on which he could live.

134 Malta has few true soils but, rather, laboriously garnered and transported
311 inorganic material, carefully built up with humic additions, terraced and walled into place and irrigated wherever possible. For millennia this making of *'campi artificiale'* has gone on and may still be observed, so that some two-thirds of what Bernard Shaw called 'a heap of stones' is now cultivable land. This process of the extension first of hydroponics and then of true farming over bare rock and the reclamation of unhealthy lowland has meant the creation of new and precarious balances. The artificially produced thin pseudo-soil is not self perpetuating. The underlying rock must be regularly chipped away, the solution hollows periodically harvested. The texture must be maintained by the addition of organic matter and by frequent working. The level of nutrients must be kept up with dung and fertilisers and the water content supplemented by irrigation. The terrace walls need constant repair.

In each case there is a sharply critical point beyond which action spells danger. The use of refuse brings bacterial and virus infections, frequent tillage produces a clean surface vulnerable to erosion, the use of irrigation water and artificial fertilisers raises soil salinity. Extension of the soil cover decreases the rate of percolation replenishment of the subterranean aquifers by rain water. Malta is now in fact living on capital as far as water is concerned.

241 There have been similar critical points in crop values. When water is available, the potential crop range is large - bananas grow in barley patches, date-

2: Boissevain E-5 (1960-1961) 1965
EZ6 Malta EZ6

CHAPTER I

The Background

Malta and her sister islands, Gozo and Comino, lie midway between Gibraltar and Lebanon, at almost the exact geographical centre of the Mediterranean. Sicily lies just 58 miles to the north, Tripoli 220 miles due south and Tunis slightly over 200 miles to the west. The Maltese archipelago thus forms a port of call between Europe and North Africa, between the Christian and the Moslem worlds. The Maltese have been in contact with both for centuries, and the cultures of both have contributed many traits which the islanders have adapted to their own use.

Malta, the largest and southernmost island, is seventeen miles long and nine miles wide, and covers an area of 95 square miles. Gozo is only nine miles by five miles, with an area of 26 square miles. Finally, the little island of Comino, which lies in the three-mile-wide channel separating the two larger islands, has an area of one square mile.

The islands are composed entirely of tertiary limestone, and the soil consists of clays and marls. Although the land rises to a maximum of little more than 800 feet near Dingli, the terrain is varied, and often broken, with jagged escarpments falling into narrow valleys, which run out to level fields. A visitor to the islands, especially during the long dry summer, is struck at once by the absence of vegetation and the rocky aspect of the countryside. This is, in part, a false impression, for although there are few trees, rubble retaining and boundary walls hide the network of small cultivated fields. Occasionally, the dark green foliage of a carob or olive tree reaches over these stone enclosures to add a sudden splash of colour to the shimmering white-yellow of the summer landscape.

The soft yellow limestone gives a continuity to the scenery. Houses, villages and whole towns seem to grow up out of the rocky matrix from which they are built, and from which they are distinguished only by the regular outline of the buildings against

[text continues on p. 3]

2: Boissevain E-5 (1960-1961) 1965
EZ6 Malta EZ6

the glaring skies. This stone, so characteristic of Malta, provides a gradual transition from the open country to the compact, densely populated communities in which the people live.

II

In 1960, just under 329,000 people lived on the islands' 122 square miles. This makes the Maltese archipelago, with a population density of 2,700 per square mile, one of the most thickly populated countries in the world. Slightly over half the population live in the urban area which centres on Valletta and the Grand Harbour. The rest, and the part with which this study is concerned, live in clearly separated villages and towns outside the conurbation. The population of Gozo is 28,000, and that of Comino 30.

The pressure of a numerous and fertile population on a very limited area has long been one of Malta's most serious problems. The Maltese marry rather early and, in the past, have been encouraged by the clergy and public opinion to have large families. But the Church in Malta has finally and officially recognized the problem, and recently opened a medical advisory service for married couples. During the period 1957–60, births averaged 8,600 per annum and deaths 2,820, thus the natural annual increase was about 5,780. As the net emigration during this period was 2,170 annually, the total population increased at an annual rate of approximately 3,610. Emigration, however, has taken off many of the young men and left a surplus of females. In 1960 there were 747 men between the ages of 20 and 34 for every 1,000 women in the same age group.[1]

III

Malta's documented history stretches back over a thousand years. The summary of it given here makes no pretence of originality. With but few exceptions, it is based upon the well-known published sources listed in the Bibliography. My sole object is to enable the reader to see the present political system in its historical perspective.

Throughout history, Malta has been subject to many different

[1] *Statistical Abstract of the Maltese Islands, 1960* (Valletta, Central Office of Statistics, 1961). C, pp. 2–3.

3: Buxton D-5 (1920-1921) 1922 EZ6 Malta EZ6

In Oxford, Professor Arthur Thomson has set the resources of his Department, including a calculating machine, at my disposal, and has helped me continually with advice and kindly criticism. My former teachers—Sir Arthur Evans, Mr. Henry Balfour, Mr. E. T. Leeds, and Professor J. L. Myres—have accorded me in many conversations the combined privileges of a colleague and a pupil. I fear that I have, albeit unwittingly, often pirated their ideas. My colleague, Miss Blackwood, has devoted the greater part of a Long Vacation to helping to finish and prepare this paper for the press before my leaving England, and has performed the laborious task of looking over proofs in my absence.

II.—Geography.

The Maltese archipelago consists of the islands of Malta, Gozo, Comino, Cominetto and Filfola. The two latter are uninhabited, and Comino is practically untenanted. We are therefore only concerned with the islands of Malta and Gozo.

Malta lies about 60 miles south of Sicily and 180 miles north of the African coast. Its maximum length is 18½ miles, its maximum breadth 8½ miles, and its area 95 square miles. Gozo is considerably smaller, and has an area of about 20 square miles.

Geologically, the islands are Late Eocene (3). The eastern and most thickly inhabited part of Malta consists of globigerina limestone, which overlies lower coralline limestone; in the western part these beds are covered with beds of greensand and blue clay or marl, over which lies the upper coralline limestone. The rock is everywhere extremely friable, and is perpetually disintegrating under the influence of wind and rain. Except in one or two places the soil is seldom more than a few inches deep.

The surrounding seas are warm and shallow; a rise of 50 fathoms would connect Malta and Sicily, and a rise of 200 fathoms would join North Africa and Europe and include Malta as a craggy bastion. The shallowest sea, however, lies more to the west. Malta should, therefore, be more correctly described as an outlying pier of an old land bridge rather than part of the land bridge itself. It seems probable that slow, tectonic movements are actually in progress to-day, and that the archipelago is sinking; but it is extremely unlikely that any men of whom we possess traces at present, with the doubtful exception of a few fragments from the Weid Dalam, came to Malta when it was still part of the mainland.

The island is tilted from south to north. The cliffs along the southern coast are high and precipitous, and some of the loftiest parts of the island are close to the shore.

The undercliff here forms a pleasant contrast to the less fertile parts of Malta. Carib trees are not uncommon, potatoes are cultivated on terraces, and the tiny fields are irrigated, as elsewhere in Malta, by little runlets conducted along channels

3: Buxton D-5 (1920-1921) 1922 EZ6 Malta EZ6

made of open stone pipes. On the rocks, in January, there was a wild profusion of flowering heath, of a species akin to our heather (*Erica*). Where the water overflows, there are tiny reed beds, but always smaller and less luxuriant than those of the Eastern Mediterranean. In some places on these cliffs the charlock appears to have competed successfully with *Ozalis cernua*.

The north coast is generally more shelving. There are no mountains, but the whole surface is cut by deep ravines, which are for the most part dry, but which may contain as much as three feet of water during a spate; the mouths of some of these valleys form small fiords. The western part of the island, which contains the upper coralline beds, contrasts strongly with the eastern. The hills are higher, the valleys bigger and more rounded, and the country is less parched, owing to the underlying marls. The scenery of Gozo resembles that of Western Malta, but the cliffs are higher and grander, the fields are larger, and the country is greener.

Owing to the large population every foot of soil is precious, and the whole of Malta is parcelled out into innumerable tiny fields, some hardly more than a few yards square, each being separated from the next by a stone wall. Olives and caribs grow as elsewhere in the Mediterranean, but for the most part they are limited to the courses of the streams; oranges flourish where there is sufficient water to irrigate them, but in Malta one looks in vain for the abundant orange groves of Sicily, or the pleasant tangled hillsides of Northern Cyprus. The myrtle is almost absent, the numbers of wild myrtle bushes can nearly be counted on the fingers of a man's hands. The flora (4) generally is most akin to that of Sicily; 94 per cent. of the Maltese species are found in that island, 91 per cent. in Africa, and 90·5 per cent. in the Levant (5). There are three things which are predominant in all the scenery of Malta: stone walls, goats, and the yellow flowers of the virulent *Ozalis cernua*, which not even the goats will eat.

Owing to the small size of Malta and the nature of its surface, the weather is dominated by two factors—the sea and the direction of the wind. The mean annual temperature is 66·6° F., the mean annual rainfall is 21·6 inches, precipitation normally occurring on 81 days. The mean relative humidity for seven years is 79·1 per cent. The coldest month is February (mean temperature 52·9° F.); the hottest August (77·9° F.). During June and July practically no rain falls, and in August the mean is only 0·13 mm. (6).

In working out constants, I have divided the islands into two areas—Urban and Rural. This is the division in the census (31), and corresponds very closely to a marked difference in the conditions under which the population lives. The former includes the fortified towns and suburbs, Valletta, Floriana, Cottoneria, Senglea, Conspicua, Sliema, St. Julian, Pieta Misida, Hamrum, Birchircara, Curmi, Paula, Tarxien, Zabbar, Calcara and Rabato; the latter, the more isolated villages in the country.

3: Buxton D-5 (1920-1921) 1922 EZ6 Malta EZ6

The fortified towns and suburbs, apart from Rabato, form a practically continuous inhabited area. The population, especially in the suburbs, is extremely overcrowded. The country villages are irregularly built along a series of winding lanes, which converge on an open space not infrequently situated in front of the village church. In a corner of such a *piazza* there is usually a café, and it is here that the majority of measurements of the country people were taken, very often as the men came out of Mass on Sunday. Some of the villages have orange gardens, wherever there is sufficient water to spare for irrigation purposes.

Although with modern means of transport it is possible to visit practically the whole island in one day, many of the villages are nearly endogamous, in spite of the absence of geographical boundaries. The men of one village will certainly not seek their wives from a neighbouring village. If they marry outside their own hamlet, it will probably be with a girl from the suburban area. Similarly, many of the town dwellers find wives among the daughters of the country folk. No such distinctions appear to hold in the urban districts. Communications within this latter area are good and cheap, and extensive use of them appears to be made by the whole population.

III.—History.

The ethnological history of the archipelago is not as yet very clear, and further evidence is badly needed. A very interesting cave, usually known as Ghar Dalam, has been excavated by Mr. Despott, to whom I am indebted for permission to examine his finds and his MS. notes. The valley (the Weid Dalam) in which this cave is situated, shows signs of three terraces. The earliest terrace is high above the present level of the stream, which runs on the level of the old second terrace, and the third terrace, on a still lower level, is in most places filled up by *débris*, brought down by the present stream or its immediate predecessor. The second terrace appears to belong to two different periods, as there are in places marks on the rock of undercutting by the swirling of a stream at two very different levels. The river which cut out these terraces must, at least in flood time, have contained a considerable volume of water. The modern stream is, however, even at the wettest time, hardly more than a series of disconnected pools. The Ghar Dalam cave belongs to the earlier part of the second terrace. It contained numerous sherds, mostly Bronze Age. By far the greater part of the cave, however, was filled up with a very large number of bones, the majority of which belonged to a species of pygmy hippopotamus. These bones, and even the teeth, show considerable evidence of attrition by water.

In this fossil bed Mr. Despott claims to have discovered the remains of Neandertal man. All the human remains that have been found consist of very small fragments, and apart from one tooth, there is no evidence to show that these bones really belong to Neandertal man. The tooth is a molar exhibiting unusual characters, but in the absence of X-ray photographs or a section, and comparison with

7: Busuttil I, Y-4, 5 (no date) 1894
EZ6 Malta EZ6

OMENS AND SUPERSTITIONS

ST. PAUL'S TONGUE

It was a popular belief among our ancestors that the teeth of fish, which we find embedded in some of the rocks, are St. Paul's *tongue*, which during his sermons penetrated even the solid rock. These fossils were pounded and the powder was held to possess a miraculous power in healing wounds.

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Till recently it has been known that some of our countryfolks used to carry one of these teeth about with them, sometimes mounted on silver and hung about their necks, as an amulet against the bites of venomous vipers—at one time very abundant in Malta.

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9: Luke G-5 (ca. 1920-ca. 1960) 1960
EZ6 Malta EZ6

CHAPTER II

Where and What is Malta?

133 SEVENTEEN MILES IN LENGTH AND NINE MILES ACROSS AT ITS widest, with its long axis running north-west and south-east, Malta is the principal island of one of the smallest archipelagoes in the world, a survival from those remote days when continents were differently shaped and the Mediterranean was a cluster of fresh-water lakes, divided by land bridges that connected Europe with Africa. Of one of these bridges the Maltese archipelago is to-day the sole existing pier, the one remaining fragment of a causeway along which prehistoric pachyderms and ruminants groped their puzzled way to the African warmth when driven from Europe by its increasing glaciation. Some of these mighty beasts lingered too long on the Maltese pier, and the cave of Ghar Dalam, "the Cave of Darkness," near Bir Zebbuġa at the southern extremity of the island, is a storehouse of their remains, converted in the course of ages into layers of fossil deposits as important as any of their kind in the world.

648 175 (133) This position midway between two continents has at times created doubts in the minds of scientists no less than of administrators as to the one to which Malta should properly belong, just as doubts have been expressed whether Cyprus should be held to belong to Europe or to Asia. These doubts were set at rest, from the legal point of view at all events, soon after the British Occupation. For in 1801 the Parliament of the United Kingdom gravely enacted, in clause 3 of 41 Geo. III cap. 103—or, to give the law its full title, "An Act to empower His Majesty to regulate the trade and commerce to and from the isle of Malta until the signing of a definitive Treaty of Peace, and from thence until six weeks

[TEXT CONTINUES ON P. 18]

9: Luke G-5 (ca. 1920-ca. 1960) 1960
EZ6 Malta EZ6

term by the numerous British Service men and women who have been stationed in or have passed through Malta, *sahha* has been admitted, in the form "saha," into the more recent editions of *The Concise Oxford Dictionary* as an English word for "good-bye," with due acknowledgment of its Maltese origin. And perhaps "saha" is but the forerunner of others; for in its issue of the 5th January 1945 the London *Spectator* had this to say on the etymology of the word "spitchered," which occurs in one of the war books on Malta:

> The word clearly derives from the Maltese *spiċċa*, meaning "finished" or something similar. Naval opinion agrees with Air Force opinion on that. But naval opinion claims credit for embodying the word in the English language. And as naval opinion can point to its use as long ago as 1903, the Air Force does seem to be grounded or, indeed, spitchered on this particular point.

4

In some parts of the Old World the visitor can select, according to his tastes, the century that he prefers. It is no exaggeration to say that in Malta he can choose the millennium and more than the millennium. If he is a palæontologist he may wander about the cave of Ghar Dalam and study *in situ* the remains of the elephants and hippopotami who left their bones there when the world was yet young, and of giant swans who sailed on lakes that have long since vanished. Advancing from these and from the Neanderthal Man, of whom traces may have been found in Malta, many thousands of years into the Stone Age, he will find in Malta and Gozo a series of megalithic and neolithic sanctuaries—Tarxien, the Hypogeum at Hal Saflieni, Ħaġiar Qim, Mnajdra, Ġgantija, to mention only the most important—unequalled in any other part of the world.

He will find other survivals of the Stone Age, of a different sort, in the cart-tracks which traverse many of the barren

9: Luke G-5 (ca. 1920-ca. 1960) 1960
EZ6 Malta EZ6

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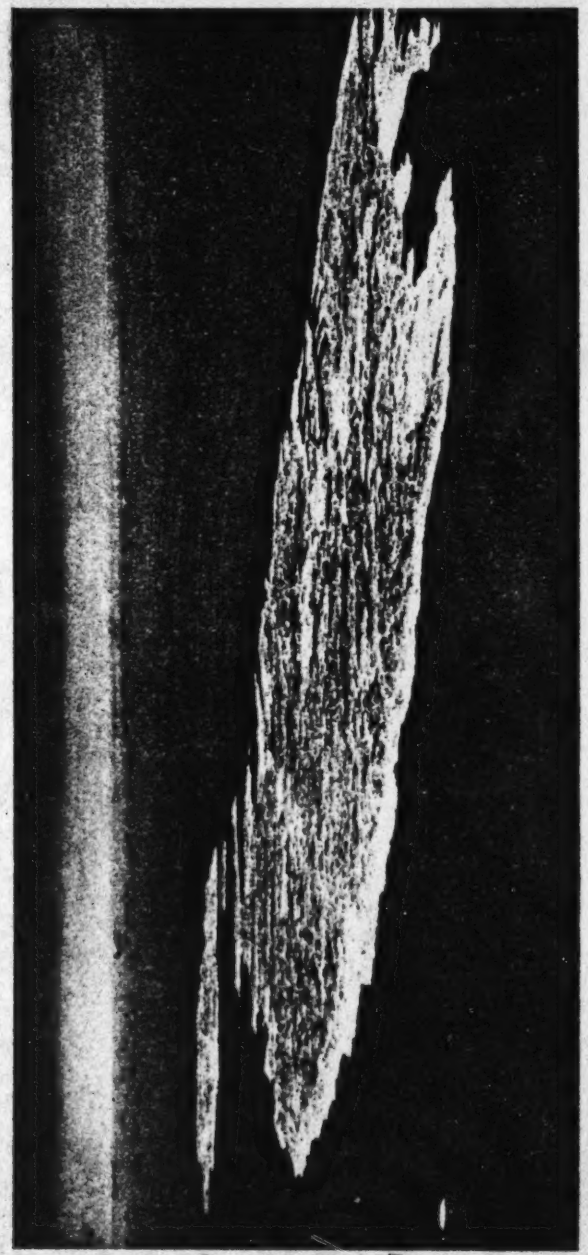

THE MALTESE ARCHIPELAGO FROM THE AIR
In left foreground the islet of Filfla.

[facing P. 40]

9: Luke G-5 (ca. 1920-ca. 1960) 1960
EZ6 Malta EZ6

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MDINA, "THE NOTABLE CITY"
In the background Mosta, with its domed church.
[*See pp.* 90 *and* 203.]

THE CATHEDRAL, MDINA, FLOODLIT FOR THE JUBILEE OF KING GEORGE V
[*See p.* 88.]

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[facing p. 97]

9: Luke G-5 (ca. 1920-ca. 1960) 1960
EZ6 Malta EZ6

CHAPTER XVII

Casals and Countryside

OWING TO THE DENSITY AND RAPID GROWTH OF THE population, to the lack of soil and to the abundance of excellent building-stone, which not only takes on in the course of ages a beautiful patina but is easy to work, the proportion of Malta's built-up area to the area under cultivation is probably uniquely high. Unique is probably also the "Red Soil Law" whereby anyone about to erect a house is compelled to dig up and hand over to the Government (which removes it for him) any soil there may be on the site of the future structure, so that the precious earth may not be buried and lost for ever to the island's cultivators.

So precious is it that the smallest pockets, however inaccessibly they may be situated, are jealously conserved. Malta is low-lying—in the words of Tasso

giace Malta fra l'onde occulta, e bassa

—and only on the thyme-covered cliffs of the south-western stretch of coast does it rise as high as 800 feet. These cliffs are wild and rugged and sheer, but here and there, as they drop precipitously to the sea, narrow ledges of earth-covered rock cling precariously to their face. But even these *redums*, as they are termed—the like of which I have seen only on that hermit-inhabited spur of Mount Athos which is called Kerasia—are brought into use by the indomitable Maltese farmer of the locality, who sometimes lives in the caves beside them with his family and his animals as his Stone Age predecessor lived in them before him.

Thus every nook and cranny of these islands is eloquent of their past: towns; casals; little country chapels, farmhouses and isolated gateways, which are often adorned with

9: Luke G-5 (ca. 1920-ca. 1960) 1960
EZ6 Malta EZ6

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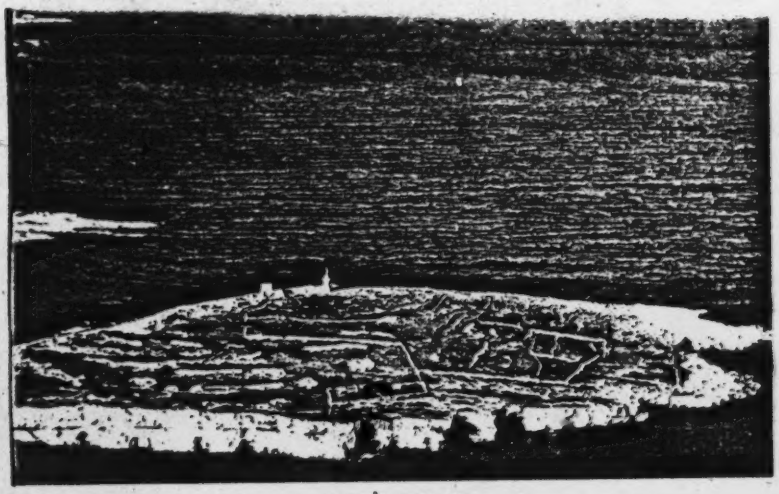

S. PAUL'S ISLAND
[*See pp.* 21, 87 *and* 213.]

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SELMUN PALACE
[*See p.* 213.]

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[facing P. 208]

9: Luke G-5 (ca. 1920-ca. 1960) 1960
EZ6 Malta EZ6

(and where do they not exist?), his book gave a certain amount of offence in the more sensitive quarters of the island. None the less, it includes a chapter which should have atoned for any "causes of stumbling" created in those quarters. The chapter is entitled "Dolores" and concerns the Shepherds' Maltese maid-of-all-work and their baby's nurse. "Dolores" is not only a telling tribute to some of the salient virtues of the Maltese character; it is one of the most sensitive and moving descriptions of the personal devotion of a servant to her employers and her charge that I have had the good fortune to read.

4

A word has been said earlier in this chapter as to the grandeur of the cliff scenery of Malta. Inland, on the other hand, the countryside can scarcely be called either grand or impressive, and during the dry summer months there is little colour to set against the brown aridity of the fields other than the sage of the olive, the carob and the fig-trees, and the pinks and whites of the oleanders beside the roads. But after the autumn rains have begun to refresh the parched earth the land rapidly assumes a mantle of young green, and the wild flowers appear shyly above ground, beginning with two lovely miniature blooms—the brilliantly blue *Iris minuta* and the even more ethereal, strongly scented "*satarina*" (*N. serotinus*). This, the tiniest of the narcissi, looks as if it had been called into being by a touch of the fairy's wand in Walt Disney's *Fantasia*.

Later, in March and April, Malta and Gozo alike seem to glow with the crimson, deepening into purple, of the *sulla*, the clover or sainfoin with which thousands of acres are sown for fodder. Among the most striking blends of colour are those produced by many varieties of Bougainvillæa (which flourishes exceedingly in Malta) and the purple-and-cream flowers of the wild caper, against the background of the rich gold of the fortifications.

9: Luke G-5 (ca. 1920-ca. 1960) 1960
EZ6 Malta EZ6

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ROMAN INSCRIPTION RELATING TO THE *MUNICIPIUM* OF GOZO IN OUTER WALL OF CITADEL
[*See p.* 224.]

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CLIFFS OF TA ĊENĊ, GOZO
[*See p.* 220.]

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MAIMUNA'S TOMBSTONE
[*See p.* 224.]

[facing p. 209]

9: Luke G-5 (ca. 1920-ca. 1960) 1960
EZ6 Malta EZ6
Gozo

sometimes regarded in England—in other words, as hard-headed folk whom nothing will keep out of the best jobs. It is certainly true to say that, loth as they may be to leave their own little island, when they do it is definitely to better themselves. They make excellent colonists in Australia and elsewhere in the New World, while those who emigrate no farther than Malta frequently attain distinction. The story is told of a function in S. John's Co-Cathedral in Valetta at a time, not so many years ago, when the Gozitans who were leading personages in Church and State included the Archbishop of Malta, Mgr Pace.

"Well," said a Maltese worshipper, after watching the entry into the church of the procession of Archbishop and Canons and other dignitaries, mostly (or so it seemed to him) natives of the junior island, "I suppose we ought to be thankful that the sacristan is still a Maltese."

Byron may have had something similar in mind when he bracketed Malta with Gozo as

> Calypso's isles,
> The sister tenants of the middle deep,

instead of describing them as mother and daughter.

There is much to see in this small island of 27 square miles and as many thousand inhabitants besides natural scenery and the monuments alluded to above. Let me instance some characteristic features of various widely different epochs of Gozo's long history. First must come the twin Stone Age temples of Ggantija, through their cyclopean construction—one block has the formidable dimensions of 12½ by 17½ feet—the most stupendous work of Neolithic man in the Maltese archipelago. Farther excavation by the Malta Museum is planned on and around their site when funds permit, and more wonders may yet come to light. Meanwhile the visitor may enjoy from one of the most impressive architectural survivals of remote antiquity a comprehensive view of Gozo and of the north-western end of Malta, with

9: Luke G-5 (ca. 1920-ca. 1960) 1960
EZ6 Malta EZ6
Gozo

Comino between them separated from the islet of Cominotto by a channel of the palest green.

Traversing thousands of years, let us next notice a reminder of the rule of Rome in the Latin inscription embedded in the entrance to the citadel, dating from the time when Gozo was a separate *municipium* of the Roman republic. Now for a glimpse of Islam, a legacy of the two centuries—from 870 to 1090—when the Arabs were the lords of these islands. Between the villages of Xewkija and Sannat on the road now called Ta Maimuna was discovered about three hundred years ago a slab of marble bearing an Arabic inscription in Kufic characters. This slab was the tombstone of an Arab girl named Maimuna, and the inscription is not only a fine piece of lapidary work but a human document from which I quote without apology:

> "Ask thyself," cries Maimuna from the grave, "if there is anything everlasting, anything that can repel or cast a spell upon death.
>
> "Alas, death has robbed me of my short life; neither my piety nor my modesty could save me from him. I was industrious in my work, and all that I did is reckoned and remains.
>
> "Oh, thou who lookest upon this grave in which I am enclosed, dust has covered my eyelids and the corners of my eyes.
>
> "On my couch and in my abode there is nought but tears; and [what will happen] when my Creator comes to me?
>
> "Oh, brother, take. . . ."

And here little Maimuna's pathetic message comes to an abrupt end.

The passage of a few more centuries brings us to the spacious days of the Knights of S. John, the study of whose rule in Gozo may be facilitated by reference to the archives of the island's "University," for Gozo had, like Malta, its own "University" until the beginning of British rule.[1] It

[1] These archives were rescued from oblivion after the Second World War by the Commissioner of Gozo, Mr E. Montanaro, and are now preserved in the Commissioner's Office.

9: Luke G-5 (ca. 1920-ca. 1960) 1960
EZ6 Malta EZ6
Gozo

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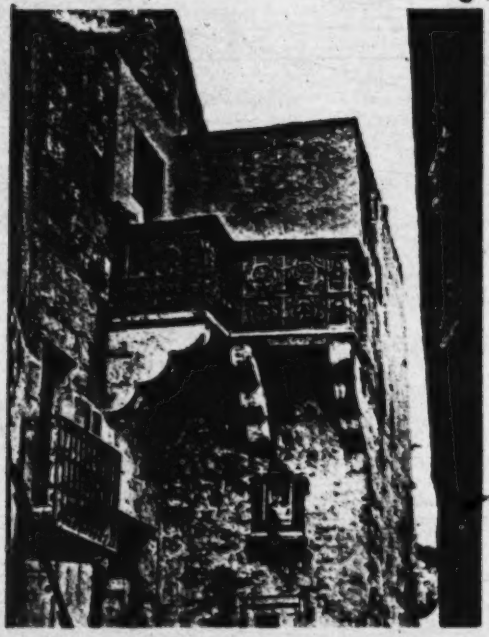

CHARACTERISTIC STONE BALCONY, VICTORIA, GOZO
[See p. 220.]

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LANDLOCKED BAY OF KAWRA, GOZO
[See p. 220.]

[facing P. 224]

9: Luke G-5 (ca. 1920-ca. 1960) 1960
EZ6 Malta EZ6
Gozo

may also be combined with a tricky piece of rock-climbing— how tricky the writer can testify from personal experience— by anyone prepared to scale the precipitous islet known as the Fungus Rock, which closes the entrance to the lagoon of Qala Dwejra.

This impressive and now almost inaccessible rock takes its name from the strange and repellent-looking black plant (*Fucus coccineus melitensis*) which grows on its summit and in the days of the Order was regarded as a sovereign remedy against hæmorrhage and dysentery. The plant was a perquisite of the Grand Masters, and a guard was provided in a tower on the mainland to keep away trespassers. Those who came legitimately to take the fungus landed by means of a basket suspended on ropes stretched between the rock and the nearest point on the mainland; an old water-colour in the Malta Museum depicts this means of transit, which has long since disappeared. It was evidently of a somewhat precarious nature, at all events to judge from the account of a gentleman who effected the passage in 1815:[1]

> One object of curiosity on the south side of the island [*sc.* Gozo] is a rock, on which grows a kind of fungus, which is used as a styptic. The passage to this rock is rather curious, if not dangerous; two ropes are made fast on each shore, on which a box with grooves on its edges passes over. A Maltese first works his way across, then the person desirous to go over draws the box back and seats himself in it, when he is hauled over by the guide; in this manner as many as please can go, one at a time.
>
> It is not a very pleasant sensation to be suspended some hundred feet above the water, and if there is any wind, the movement of the box is anything but agreeable, and all that can be obtained are a few pieces of fungus. I was well pleased to be back again, and made a determination never to risk my precious carcase in that conveyance again. It seems very strange to be swinging up in the air between two rocks, with sea-gulls and other aquatics flying about below you.

[1] From *Malta Sixty Years Ago*, by Claudius Shaw (London, 1875).

9: Luke G-5 (ca. 1920-ca. 1960) 1960
EZ6 Malta EZ6
Gozo

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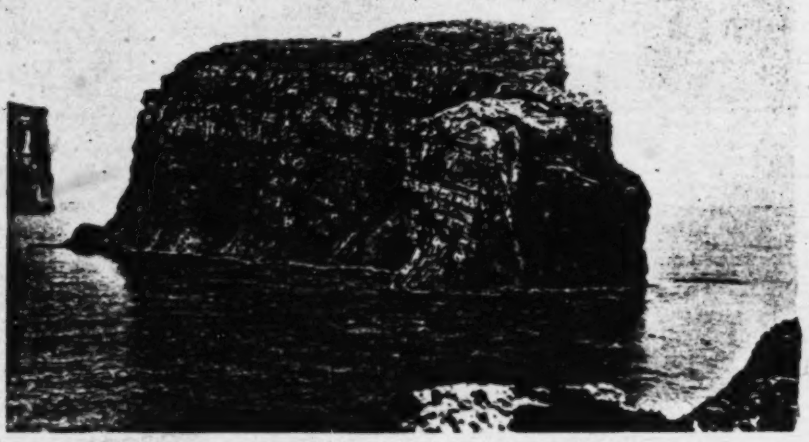

FUNGUS ROCK, GOZO

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THE SAME, SHOWING ANCIENT ROPEWAY
From an old water-colour in the Malta Museum.
[See p. 225.]

[facing p. 225]